# THE JOURNAL OF GAS LIGHTING
## WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXV. No. 1915.] LONDON, JANUARY 23, 1900. [52ND YEAR. PRICE 6d.



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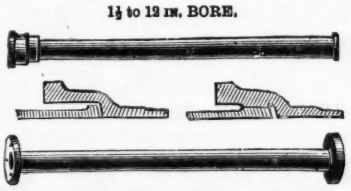

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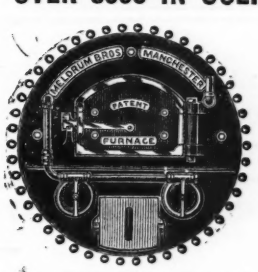


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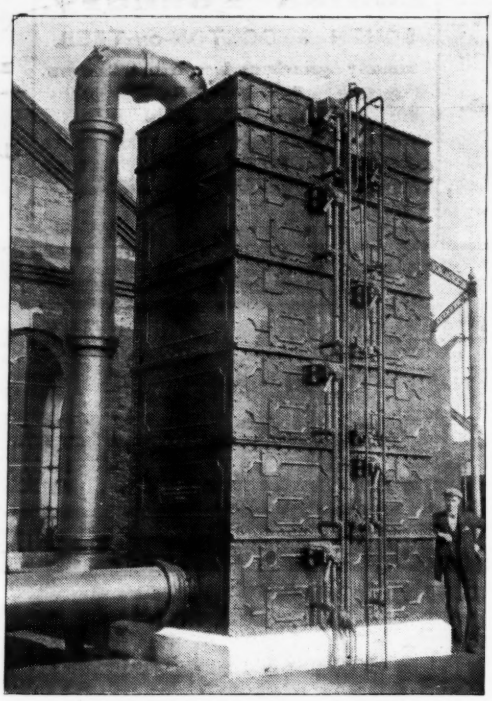

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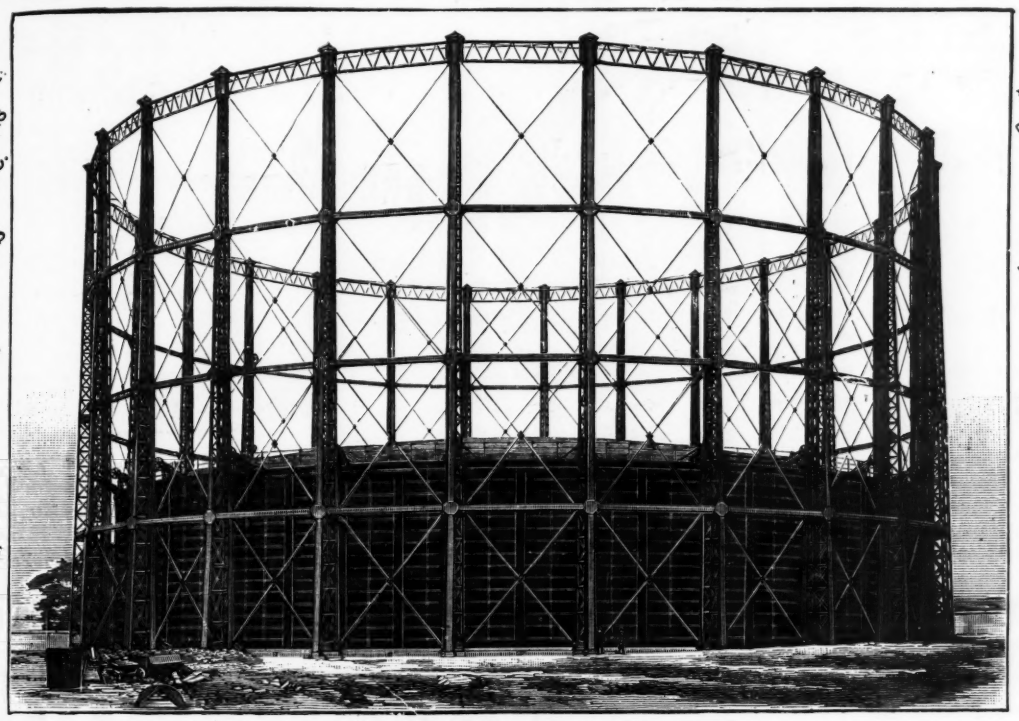

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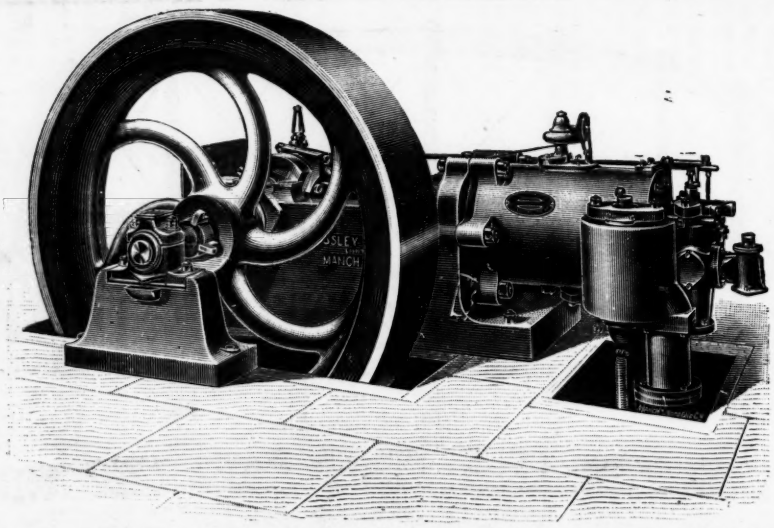

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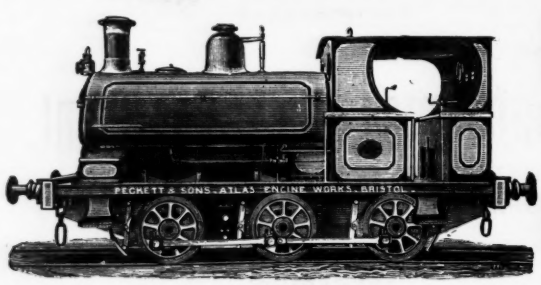


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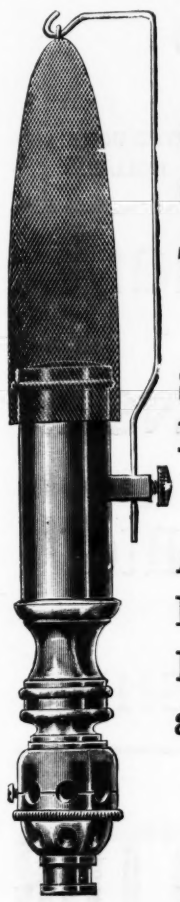

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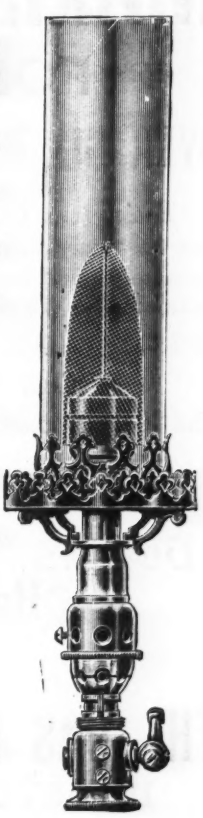

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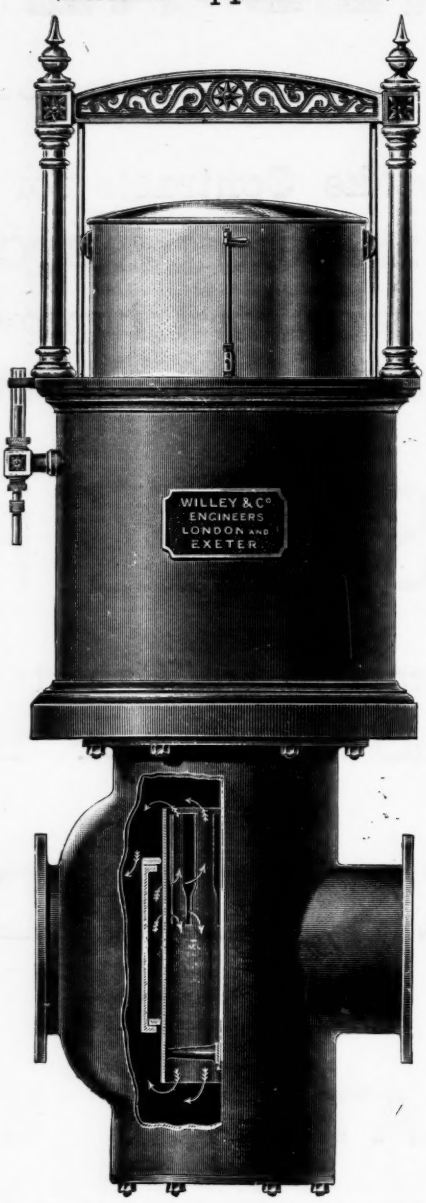


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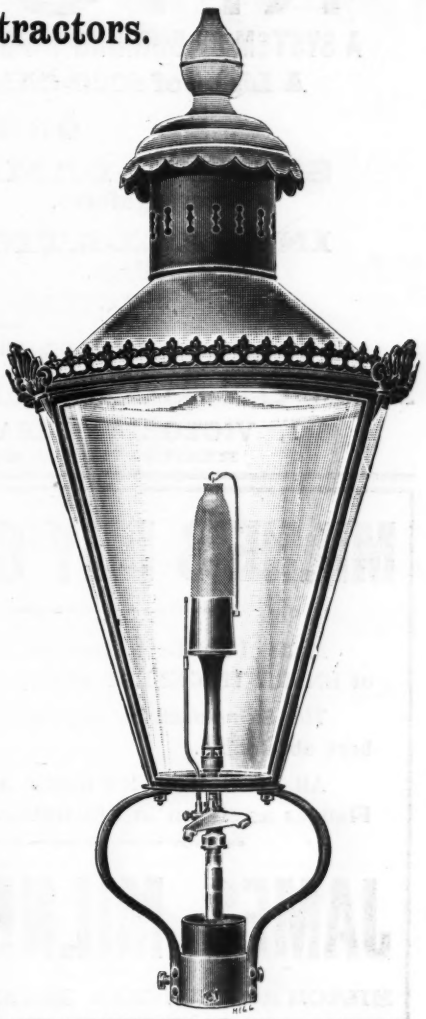

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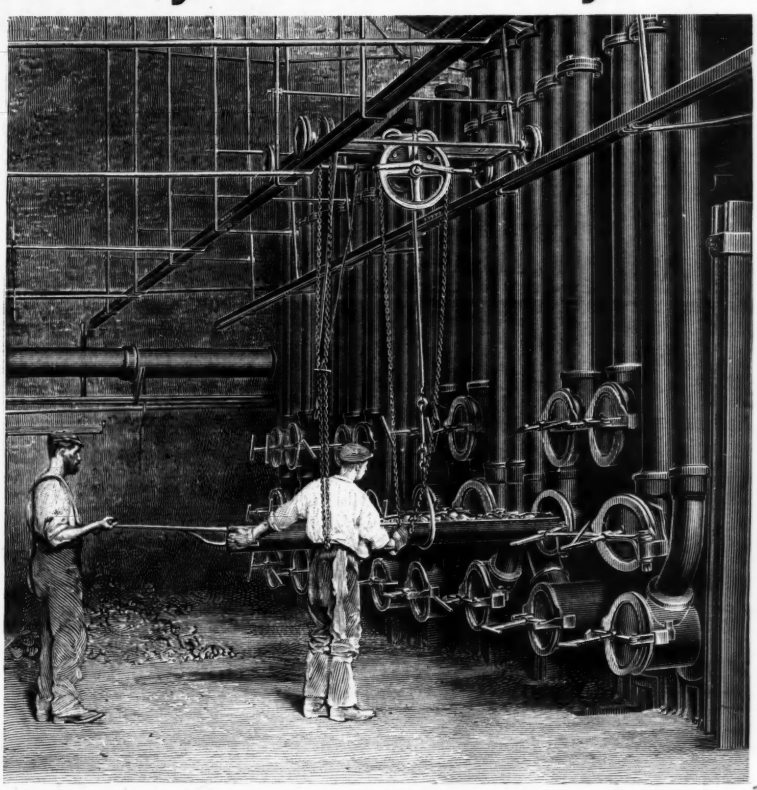

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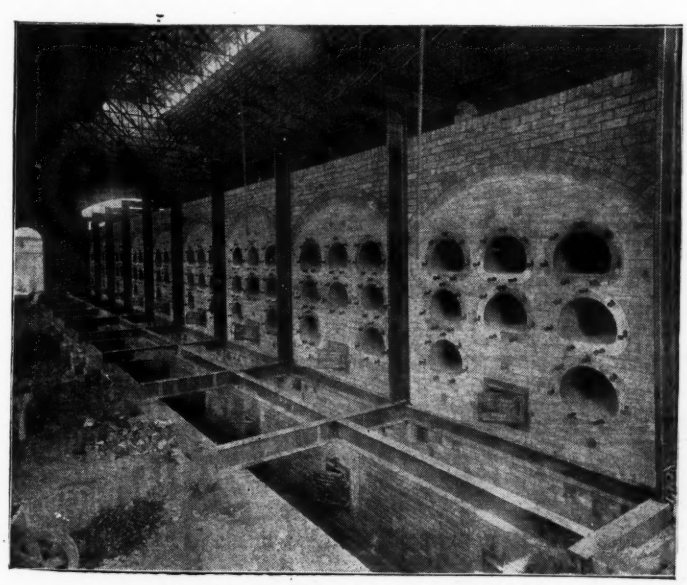

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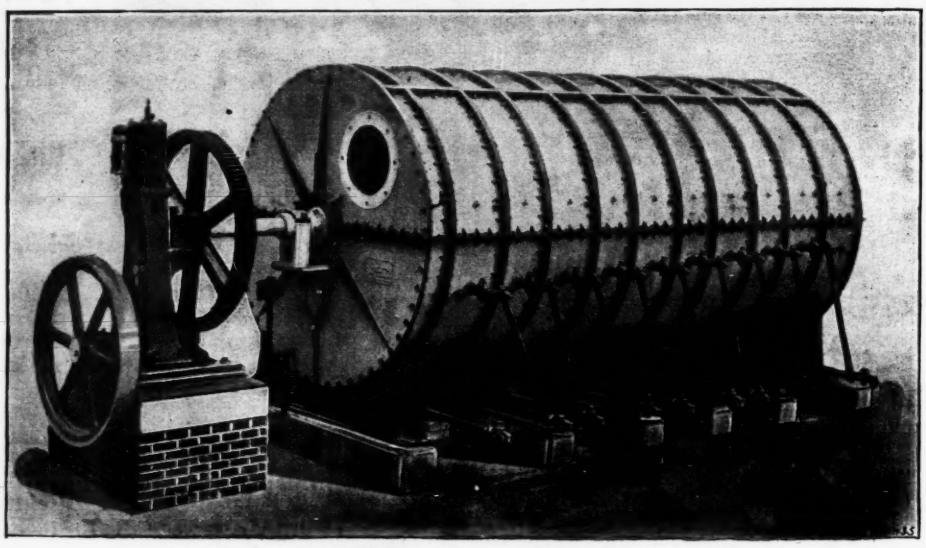

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| Brussels (Second Contract) | 700,000 |
| Liverpool | 3,500,000 |
| Liverpool (Second Contract) | 4,500,000 |
| Tottenham | 750,000 |
| Tottenham (Second Contract) | 750,000 |
| Santiago de Cuba | 400,000 |
| Swansea | 750,000 |
| Manchester | 3,000,000 |
| Brighton | 1,750,000 |
| Preston | 1,500,000 |
| New York | 1,200,000 |
| Southport | 750,000 |
| Bath | 1,000,000 |
| Newburgh, N.Y. | 350,000 |
| Newburgh, N.Y. (Second Contract) | 250,000 |
| Hoylake | 125,000 |
| Coventry | 600,000 |
| Coventry (Second Contract) | 600,000 |
| Bordentown, N.J. | 125,000 |
| Winchester | 200,000 |
| Shanghai | 225,000 |
| Stockport | 500,000 |
| Norwich | 1,000,000 |
| Holyoke, Mass. | 600,000 |
| Lea Bridge | 350,000 |
| Lea Bridge (Second Contract) | 350,000 |
| Stockton-on-Tees | 500,000 |
| St. Joseph, Mo. | 750,000 |
| Edinburgh | 2,000,000 |
| Guildford | 350,000 |
| Brentford | 1,200,000 |
| Bridlington | 125,000 |
| Syracuse, N.Y. | 850,000 |
| Middlesbrough | 1,250,000 |
| Croydon | 1,250,000 |

| | Cub. Ft. Daily. |
|---|---|
| Commercial Gas Co. | 850,000 |
| Commercial (Second Contract) | 850,000 |
| Commercial (Third Contract) | 1,250,000 |
| L. & N.W. Railway, Crewe | 700,000 |
| Taunton | 225,000 |
| Lawrence, Mass. | 400,000 |
| Rotterdam | 850,000 |
| Dorking | 125,000 |
| McKeesport, Pa. | 500,000 |
| The Gaslight and Coke Co., Bromley | 3,750,000 |
| The Gaslight and Coke Co., Nine Elms | 2,750,000 |
| Durham | 200,000 |
| New York (Remodelled) | 11,000,000 |
| Scarborough | 800,000 |
| Perth, W.A. | 125,000 |
| Bremen | 550,000 |
| Maidenhead | 225,000 |
| Epsom | 225,000 |
| North Middlesex | 150,000 |
| Wandsworth and Putney | 1,800,000 |
| Aarhus | 800,000 |
| Falmouth | 150,000 |
| Southampton | 800,000 |
| Hartlepool | 750,000 |
| Utrecht | 1,000,000 |
| Deventer | 150,000 |
| Portsmouth | 1,000,000 |
| Bournemouth | 1,000,000 |
| Aylesbury | 150,000 |
| Hamburg | 1,750,000 |
| Dublin | 2,000,000 |
| Redhill | 275,000 |
| Posen | 450,000 |
| Dunedin (N.Z.) | 150,000 |
| Stockport (Second Contract) | 500,000 |
| Brighton (Second Contract) | 1,750,000 |
| Croydon (Second Contract) | 625,000 |
| Maidenhead (Second Contract) | 225,000 |
| The Gaslight and Coke Co., Beckton | 2,250,000 |
| The Gaslight and Coke Co., Fulham | 1,750,000 |

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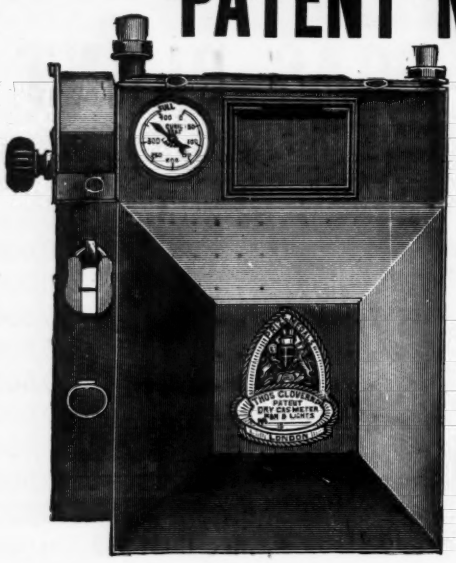

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## EDITORIAL NOTES.

### The Labour Market and the Coal Difficulty.

THE report of the Board of Trade upon the state of such portion of the Labour Market as their statistics cover in the month of December, shows that employment continues good all round, and especially so in the coal mining and iron and steel trades. The percentage of men unemployed in the Trade Unions making returns continues to be lower than at any similar period of the year since 1889. The war's demand upon the working classes is, of course, partly responsible for the smallness of the number of men unemployed; but the prime cause is still, without doubt, the revival of trade. In almost all those industries for which such statistics are available, it is to be observed that the number of men employed, and the average number of days or shifts worked, was higher at the end of 1899 than it was at the end of the previous year. We refer again to the condition of the Labour Market, and especially to the statistics in point, chiefly to remark that these statistics, so far as the coal trade is concerned, tend largely to discount the excuse that is frequently put forward at the present time by colliery owners who are—and which of them are not?—largely in arrear with their deliveries, that their failure to fulfil their contract obligations is due to the disinclination of the miners to work so many days in the week, at the present high rates of wages, as they worked when lower rates prevailed. We have before pointed out that, as the estimated output of coal in the United Kingdom for 1899 was something like 10 per cent. higher than in 1898, it was obvious such a state of affairs as was depicted by contractors could not be ruling in every district.

Turning to the Board of Trade report on Coal Mining in December, we find figures bearing on this point which, while not covering the whole industry, refer to sufficiently large numbers of miners to be fairly representative, and which are decidedly instructive. Returns relating to pits at which some 445,469 workpeople were employed show that these pits were worked, on an average, 5·65 days per week in the four weeks ended Dec. 23 last, as compared with 5·64 days in November, and 5·54 days a year ago. Or, taking another table, it is seen that, of the workpeople referred to, 37·8 per cent. were working full time, and 54·9 per cent. were working from five to less than six days per week, in December, 1899, as against 31 per cent. and 57·2 per cent. respectively in December, 1898. That is to say, 92·7 per cent. were employed at pits working five or more days per week (and the figures were the same for November as for December), as compared with 88·2 per cent. in the corresponding month of the previous year. When we add that this improved working is shown, by a further table, to have prevailed in every district except two in England—namely, Yorkshire, where the average number of days worked was 0·01 less, and Derbyshire with an average less by 0·04 day—and in all but one small district in Scotland, it will, we think, be seen that there is much ground for adding a considerable "pinch of salt" to the excuse of "idling miners" put forward by defaulting contractors. The fact is there is simply one explanation of the shortage of coal—namely that, while the output for the year 1899 was greater than ever before, the demand was still more in excess of that of previous years; and collieries, to use an expressive piece of Yankee slang, "bit off more than they "could chew."

The difficulties of employers in regard to the supply of labour continue to be aggravated by the prevalence of the severe epidemic of influenza, from which all classes are suffering, and which is carrying off wholesale those who have outrun the allotted span of threescore years and ten. The returns published by the Registrar-General since we referred to the subject a fortnight ago have been eloquent of the seriousness of the epidemic. The death-rate in the 33 principal towns in the kingdom, which was 18·9 per thousand at the beginning of December, rose steadily, until, for the week ended the 6th inst., it reached 30·9. The following week, which is the last for which returns are available, showed a decline to 29 per thousand, while in London (where the death-rate had mounted in six weeks from 19·4 to 37·1) the rate fell 3·8 per thousand. We may hope, therefore, that—although the deaths from influenza itself were highest in the latest return, the figures for the Metropolis for the four weeks being 69, 193, 316, and 340—the worst is past, and that the temporarily disabled

workers may now soon find their way back to their duties. Gas Companies have, we learn, been severely handicapped by sickness at this, the busiest season of the year; one of the largest undertakings having something like 10 per cent. of its employees absent at one time, chiefly through the ravages of influenza. It is at such times that the advantages of membership of a sound Benefit Society, and the liability of Slate Clubs with no adequate reserve funds to fail their members just when their help is most needed, become strikingly apparent.

### The Breakdown of the Electric Lighting Acts.

THE disappointment of the West-end population with the public electric lighting is quite pathetic to witness, especially from the safe 'vantage-ground of a gas-lit interior. We have dealt in another column with some of the features of the existing situation, with special regard to the interests more immediately concerned. It is permissible, however, to discuss it here in a general way. Matters have come to a climax with the particular Electric Lighting Company implicated; the London County Council having just triumphantly brought off a prosecution for default, and secured a penalty. This kind of thing cannot long be borne by any supply undertaking; so that, unless the Metropolitan Electric Supply Company can pull themselves together in time, they will find their prospects gravely affected by their vicissitudes of the autumn. The recent deputation to the President of the Board of Trade, sufficiently dealt with elsewhere, was not remarkably disingenuous; but, unfortunately for themselves, the Directors of the Company had not been quite straightforward in their excuses for the undeniable shortcomings of their system. Apart altogether from these petty and interested considerations, there stands the main question of whether electricity supply from a central station—the term is no longer to be used in any topographical sense—is suitable for anything else than a "fancy" trade. It is admitted by "The Times" that, "of all the lights in use, the electric "light is the most irritating and depressing when "the supply is insufficient. Deficiency of other lights "causes obscurity, but leaves things in their normal rela- "tions. Electric light with insufficient voltage acquires "an abominable orange tinge, which may be warranted "to give the most tastefully decorated drawing-room the "aspect of a dungeon. But if the Companies choose to "supply electricity three or four volts below standard, there "is apparently nothing to be done except by strong-minded "people who switch off the whole thing and light a few "cheerful lamps." The writer then goes on to gibe at the Board of Trade for its failure to deliver the public from a worse tyranny than that of the Gas Companies—"these "miserable relics of dark ages in which the public was "sacrificed to monopolists." The Gas Companies have simply been succeeded by traffickers in a system in which "the badness of the light makes no appreciable difference "in the bill." There is sufficient lucidity in the mind of the writer to enable him to perceive that neither competition nor municipalization is a remedy for the evil. Two Electric Lighting Companies are not together more reliable than one; and municipalized supplies are certainly no better than others.

The important point to be laid hold of, and kept in remembrance, is that the much-vaunted Electric Lighting Acts have completely failed to protect the interests of the consumers all along the line. The cardinal feature of the Acts, in which they departed most signally from gas legislation, was their construction on the principle of limited time of exploitation. In addition, the undertakers were not to be allowed to introduce into their systems anything to the prejudice of the consumer. These statutory arrangements have now been in operation long enough to enable the public to see how the theory has worked itself out in practice. The result is not flattering to the experimentalists in legislation who imagined they were going to put in the shade the Gas Acts from 1847 onwards. Whatever effect the principle of limited duration may have on the finances of an Electric Light Company—and this has not yet been fully disclosed—it absolutely fails to benefit the consumer in the smallest degree. That Electric Lighting Company would be happiest who should so contrive all their plant of every kind that the whole would tumble into dust, like the wonderful "One-Hoss Shay," on the day after the expiration of the Provisional Order. With regard to the enactment against doing anything to the prejudice of the consumer, the recent increase of voltage of the current sent out is a violation of the spirit, even if not the letter, of the Act. Indirectly, consequentially, and remotely, the change may be to the ultimate advantage of the consumer, as tending to reduce the capital burden of the undertakers. But this benefit, such as it is, will only begin to reach the consumer in the shape of a reduction of a halfpenny per unit, or so, on the price of current after the proprietors have had their full and back dividends. That is to say, a change of system to the highest legal voltage to-day will possibly benefit the consumer ten or a dozen years hence —if the economy is not meanwhile absorbed in the charge for depreciation, which is more than likely. The immediate difference, whatever it is, is all against the consumer. We recently published an article describing the state of the incandescent electric lamp industry, and have nothing to change from. The natural and necessary improvement of the manufactured article, which follows from the development and expansion of the trade under the forcing of commercial competition, has in this case no reference to the needs of the lamp user. The march of improvement has been in the direction of the production of a lamp to suit the high-voltage current, and to sell at a reasonable price. It is so difficult to do this, that economy of current, which was being sought after ten years ago, has been ignored by common consent.

The consumer, however, suffers not only from broken lamps and a high consumption of current at the fashionable increased voltages. He is also victimized by the enhanced effect of variations of pressure at the higher limits. When central station lighting was starting at 52 volts, variations of this pressure were of comparatively little importance to the lamp user. This original voltage, by the way, was the best all round for the incandescent electric lamp. When the supply companies put up their pressure to double this figure, it was a little hard on the lamp makers; but the latter rose to it, and met the demands on their skill and resourcefulness. Meanwhile, the consumer was made to feel that a variation of 5 per cent. in the voltage was a matter of some importance to him. Still, the different parties to the connection rubbed along fairly well. The regulation of generating machinery kept pace with the advance of pressure; and as no customers of an Electric Lighting Company in the United Kingdom knew anything better, they had no legitimate grievance on this head. Nowadays all is changed, and for the worse. A drop of a few volts in the high-pressure terminals reduces the lamps to the irritating condition described by "The Times;" and the meter registers all the same. The "Pall Mall "Gazette," commenting on this state of things electrical, declares that, if it is not mended, "indignant heads of "families will be compelled to fall back on the dull but "constant ministration of the Gaslight and Coke Com- "pany." The alternative is not so bad as all that. These ministrations are not necessarily "dull," although they are virtuously constant. This is an Age that is pleased with change; and a change from electric light to gas will not be a reversion, but a step forward into greater brightness.

### The Bank-Rate.

THE directors of gas undertakings, and of all other commercial concerns, will congratulate themselves that the raising of the bank-rate to 6 per cent. on Nov. 30 last so far succeeded in its purpose of maintaining a sufficient reserve of gold in the country as to justify the Bank of England in reducing the rate to 5 per cent. on the 11th inst., and further to 4½ per cent. on Thursday last. It is unfortunate that the period of extraordinarily dear money should have come at a time when Gas Companies are almost invariably indebted to their bankers. The first winter quarter is one of heavy outgoings for coal and wages, but of light receipts for gas (for a summer quarter's consumption); and the Company that does not need to borrow then is but indifferently financed. Gas managers must, however, be thankful for small mercies—that the 6 per cent. rate only ruled for six weeks—and remember that a temporary loan, even at that rate, is cheaper than a permanent balance of floating capital equal to the needs of the pinch of the year. With trade still, in the main, so flourishing, and in view of the need of the Government of heavy loans in the near future for the prosecution of the South African Campaign (there appears little chance of it costing the country much short of a hundred millions), there does not seem to be any immediate prospect of a

return to the cheap money of a year or two since, which many good people fondly imagined to have come to stay. In fact, anything under 5 per cent. must not be grumbled at. We shall see what March and April—another heavy borrowing season for Gas Companies—have in store.

### State of the Trade Unions in 1898.

ANOTHER of those remarkable statistical compilations of the Chief Labour Correspondent of the Board of Trade has been presented to the Department by Mr. H. Llewellyn Smith, and may be bought by the rest of the world. It is the report for the year 1898 upon the membership and finances of the Trade Unions of the United Kingdom. This annual report is a more logical and instructive statement than the Departmental story of the strikes; the subject-matter being more suitable for statistical treatment. Mr. Llewellyn Smith recounts with satisfaction that "the "number of Trade Unions dealt with is no less than 1267, "with a membership of 1,644,591." The popularity of Trade Unions is plainly dependent upon their successful conduct; as it is noted that the groups of trades showing the most important increases of membership were Building and Mining, while those showing the greatest decline are Railway Service and Engineering. The report has been well done; a persevering effort having been maintained for eleven years to render the facts instructive in the fullest possible degree. It has not yet been found practicable to ascertain the exact financial liability of the individual member to his Union, nor of the Union to each of its members. A new feature has been added to the present report, which is an advance in this direction, in the shape of a table giving for 100 Unions the rates of entrance fees and subscriptions paid by members, and the scales of benefit to which they are entitled on all accounts. This is information not previously available. The railway men have apparently learnt by unpleasant experience that the delights of Trade Unionism are not for them. Of course, if there are compensations, these do not appear in this place. Those further developments of the Trade Union idea known as Trade Councils and Federations of Trade Unions do not appear to grow very fast. The number of Trade Councils rose by only one during the year; but the Federations fell off. The number of purely fighting Unions does not increase; and those which make strike benefit the chief end of their existence have been driven by necessity to add other kinds of assistance to their programme. These are the so-called New Unions formed upon the basis of threepenny weekly payments; and the extra benefits usually take the form of "legal assist-"ance" and sometimes of funeral allowances. The membership of the Gas Workers' and General Labourers' Union shows a considerable addition since 1895, which was the low-water period of this organization. The rival Union, which includes Brickmakers by name, is only a tithe as popular. Between them, the special Gas Workers' Unions claim to have upwards of 47,000 members. The weaker numerically is financially the stronger; but it does not seem to spend money on strikes. The Gas Workers laid out £5810 on "dispute benefit;" nothing on sick, accident, superannuation, or funeral benefit; £485 was given to other societies; and working expenses swallowed up £7797. This record is surpassed by the Union of Employees of Public Authorities, who spent out of their income of £1662, no less than £1136 on the upkeep of the machine.

### The Work of the Liberty and Property Defence League in the Past Year.

THE seventeenth annual report of the above-named organization, which has just been issued, shows that it is continuing its operations on the well-known lines. Lectures have been arranged in co-operation with the Individualist Club; pamphlets have been issued; and the work of the Parliamentary Department has been effectively prosecuted. At the beginning of last year the attention of the public was directed to the subject of Municipal Trading by means of a discussion at the Society of Arts on a paper read by Mr. Dixon H. Davies, noticed in our columns at the time; and, as a practical result, the League took active steps to obtain the appointment of a Parliamentary Committee to inquire into the whole question. Upwards of four hundred petitions on the subject, signed by employers, traders, property-owners, and ratepayers throughout the country, were presented to Parliament. The Government have given a definite assurance that the Joint Committee, the promise to appoint which remained unfulfilled when Parliament rose, shall be nominated next session. A long list of Bills opposed by the League is classified under several heads. The League opposed the measures dealing with the State inspection and registration of boilers and the qualification of persons in charge of them. Various efforts were made to extend the Workmen's Compensation Act; and this met with the League's strong opposition. In addition to its activity in Parliament in opposing measures, the League was engaged in supporting the General Power Distributing Company's Bill, by which it was proposed to authorize the supply of electrical energy over a large area in the county of Nottingham and the adjacent counties. Owing to the opposition of certain Municipalities who feared that the Company's competition might injuriously affect their own electrical enterprise, the Bill was thrown out on second reading. In the concluding remarks of the report, it is pointed out that, by securing the co-operation of all who are individually opposed to State Socialism, and by concentrating into a system of mutual defence the forces of the Defence Associations of the various industries in the country, and of independent companies and corporate bodies, the League seeks to resist all attempts on the part of the State or the Municipalities to restrict freedom of contract and of labour, harass private enterprise, or unduly interfere with the rights of property.

### Building Lines and Wide Streets.

THE interests of property are not always in harmony with the laws, although the latter are popularly supposed to be usually kind to the former. The difficulty of providing improved housing accommodation for the working classes in towns is very largely due to the fact that overcrowding pays the landlords, who can show huge profit rentals, and consequently high value, for property which ought not to be allowed to cumber the ground. Yet, how is the line to be drawn? The question is easier asked than answered. Recently, in recording the fact that the Wandsworth and Putney Gas Company had triumphed over the pedantic care of the London County Council for the integrity of the building frontage of an obscure lane in the riverside regions of Wandsworth, we allowed ourselves a little mild sarcasm at the expense of the County Council. We remarked on the inconsistency of this prosecution of the Gas Company with the laxity that had allowed such fine arteries as the Euston and Marylebone roads to become narrowed by building over the original forecourts. There has not been long to wait for the justification of the authority. Immediately term opened, the Court of Appeal had to deal with a case from the Pentonville Road, where the owner badly wanted to build over the forecourts of certain premises. This experience is universal, wherever business invades a thoroughfare once of residential character, with gardens in front of the houses. First, the occupier puts up a show-board behind the garden railings. This soon develops into a shed, and then into a shop. Finally, the whole building is brought forward to the new frontage-line. The old Metropolitan Board of Works tried to combine the interests of commerce and aërial sanitation by licensing these advanced buildings so long as they were not more than one storey high. It really was a choice of evils; for a decent shop was better than the squalid forecourt it usually covered. The County Council, however, are confronted with a conspiracy of property-owners and speculators to set the law at defiance and push forward the building line for all purposes to the edge of the pavement. This has now been satisfactorily checked in the Pentonville Road case; and it is to be hoped the principle will hold good, for the value of these wide channels through the mass of bricks and mortar is inestimable.

### The Prospects of the University of Birmingham.

IT has been our pleasant duty to lend such advocacy as we could command to the cause of the University of Birmingham, the principles and objects of which were again expounded last week by Mr. Joseph Chamberlain, as President of the Court of Governors of the Mason University College. For those who have to do work in the world which is ever so slightly elevated above mere drudgery, the idea of a University devoted to the highest development of practical knowledge possesses immense attraction. It is not that men of the workaday world despise the old University system, which has been happily described as the cultivation of useless knowledge. There are other things in the world besides work for wages; and

it is to be hoped that the day is far distant when men will dispense with the hoary and beautiful old foundations where for so many generations scholars have pursued uncommercial culture, and men have at least been taught that wealth is not everything, even in this world. But it has long been known that the ancient Universities are no places for men who want to learn things immediately useful in the great world outside the study or the cloister. Originally, as should always be borne in mind, even the Universities were places of practical education. In ages when all law and diplomatic writing was in Latin, a competent knowledge of this language possessed a very real value. Similarly, when the study of Greek was revived, it was because this tongue was the depository of all known truth in both science and religion. We have long since sounded these two wells of knowledge, and now only take a turn at the pumps for the sake of the exercise. Men of affairs now understand that there are things recorded in French and German which stand to them in just the same relation as Roman law and Greek philosophy stood to their forefathers; and accordingly they learn these languages for what they are worth. As Englishmen, however, with a world-language of their own, our people have no need to become as profoundly detached from their native tongue as if they were born Finns, or even Danes.

Practical science is ample enough to provide all necessary scope for University teaching strictly oriented to the useful and the known, without referring to the insoluble fascinating questions of origins, purposes, and ends which underlie religious and literary studies. Birmingham will have its Professorship of Brewing to set off against the Chair of Philosophy of an older order. After all, good beer is as much a necessity of mankind as the "quantification "of the predicate." Mr. Chamberlain expressed a wish for schools of electrical engineering, railway engineering, and railway management. The last, at any rate, is badly needed. It should not be too much to hope for a Chair of Gas Engineering, if the ideal is to be realized of every important trade having its own particular school. Why not? There are, in every big industry and trade, general principles which it behoves successful practitioners to know, but which in the ordinary way it is nobody's business to teach. Some few men are always discovering them afresh for themselves, and are apt to plume themselves upon their sharpness until they accidentally ascertain, to their discomfiture, that others knew them before. In order to save time and effort, every student fresh to the task ought to be able to begin, with preparation, where his precursor left off. That is the way to hand on the "Fiery Cross;" and it is the office of a University to facilitate the proceeding.

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**The Exportation of Picric Acid.**—By a recent Order in Council, Her Majesty has prohibited the following articles from being either exported from the United Kingdom or carried coastwise: Picric acid (trinitro-phenol), trinitro-cresol, carbolic acid (phenol), and cresyllic acid (cresol).

**Combined Refuse Destructors and Power Plants.**—At a recent ordinary meeting of the Institution of Civil Engineers, Mr. C. Newton Russell read a paper on the above subject. He dealt with refuse destruction particularly in reference to its employment for raising steam, and gave details of ten combined plants, the data of which all tended to prove that a considerable amount of energy in the form of heat is to be obtained from the burning of ordinary domestic refuse. The results obtained from eight combined plants in England and two abroad were furnished; the Shoreditch plant being described in considerable detail, as the largest of its kind in operation. The total amount of refuse destroyed during a period of twelve months was about 26 200 tons, of which 92 per cent. was ordinary domestic refuse, and 8 per cent. trade refuse, consisting of straw, paper, &c. The average cost of burning the refuse during the second year of working was 2s. 6·9d. per ton. The amount of electric energy absorbed in dealing with it was 4·98 Board of Trade units per ton per annum. With one boiler and two refuse furnaces, it was possible, by burning ordinary refuse, to evaporate 2888 lbs. of water per hour, from and at 212° Fahr. The average calorific value of various tests was 0·99 lb. of water per pound of refuse. The heating surface of each boiler was 1300 square feet; the refuse grate area was 25 square feet, and the coal grate area was 27 square feet. The total amount of energy sold by meter to consumers was 1,031,348 Board of Trade units, including 131,140 units supplied to the refuse destructor. The total amount of coal consumed in burning the refuse was 1344 tons, valued at £1308 14s. 8d. The item of cost per ton for interest and for redemption of land and plant—not usually taken into account in connection with refuse destructors—was a matter for serious consideration, and in the case of Shoreditch, where land is very expensive, the charge worked out at practically 1s. per ton.

## WATER AND SANITARY AFFAIRS.

THE long-expected final report of the Royal Commission on Water Supply was published yesterday. We briefly indicated last week the nature of its principal recommendation as to the future control of the undertakings of the London Water Companies; and we reproduce elsewhere the portion of the report dealing with this matter. It will be seen that it bears out our statement that the Commissioners would advise the placing of these undertakings under the control of a Water Board specially constituted for the purpose, with a Chairman and Vice-Chairman appointed by the Local Government Board, in order, as the report says, "that the influence of the Executive "Government should be continuously felt." We now learn something in regard to the constitution of the proposed Board. It is to be of a permanent character, and composed of thirty members—ten to be appointed by the London County Council, four by the Conservators of the Thames, two by the Lea Conservancy Board, and two each by the County Councils of Middlesex, Surrey, Essex, Hertford, Kent, and the Common Council of West Ham. The Chairman and Vice-Chairman are to receive "adequate salaries;" and a sum is to be set apart for division among the members according to the number of their attendances. The duty of the Board will be to acquire by agreement, or, failing this, by arbitration on the terms usual in cases of compulsory purchase, the undertakings of the eight Water Companies, and to carry them on. In the event of Croydon and Richmond desiring to be independent of the Board, and supply themselves, provision is made for the severance of the portions of the Companies' works in their districts, and the transfer thereof to the Local Authorities of those places. The purchase of the undertakings is to be effected by the issue of 3 per cent. stock; and the Chamberlain of London is to transfer to the Board all the proceeds of the sinking-fund clauses which have of late years been inserted in London Water Companies' Acts. After the purchase, these clauses will, of course, be repealed. The Commissioners think that, if Parliament would dispense with a sinking fund, the purchaser "would be able, by maintaining the present charges, "to pay his way," and that "the growth of the water "revenue would render it possible to reduce the charges "for water sooner than such reduction could take place "under the management of the Companies, through the "attainment of their maximum dividend and the payment "in full of their back dividends." But if the Board are unable to pay the interest on the stock without increasing the charges, they are to be authorized to do this up to the level of the Lambeth Company; and the Commissioners think it would not be "unreasonable" to empower the Board to levy a rate-in-aid of a limited amount in the event of any deficiency arising in the income. The proceedings of the Board are to be brought "periodically and auto-"matically" under the observation of Parliament. The Board are to prepare an annual report and statement of accounts (the latter to be subject to independent audit); and both are to be included in the annual report of the Local Government Board.

The report is dated the 30th ult.; and its general contents may be briefly summarized. It begins by setting forth the terms of the reference to the Commission, which was appointed on May 1, 1897. They were, it may be remembered, to inquire whether, having regard to financial considerations, and to present and prospective requirements as regard water supply in the districts within the limits of the Metropolitan Water Companies, it was desirable, in the interests of the ratepayers and the consumers, that the Companies' undertakings should be acquired and managed by one or several authorities; to what extent division of the works between different Local Authorities was practicable and desirable; what additional powers of control should be exercised by Local Authorities in the event of the undertakings not being acquired; and whether the existing distributing systems could be connected. The Commissioners then describe their method of procedure, and offer some preliminary observations on the general question of the water supply of the Metropolis; going back to the Duke of Richmond's Commission in 1869. They next deal with the financial position of the Water Companies, and discuss terms of arbitration. The contentions of the London County Council and the financial results of arbitration are afterwards fully considered; this

portion of the report occupying rather more than eighteen pages. The opinions of the Local Authorities on the purchase question are fully reviewed; and the cases of purchases by Provincial Corporations examined. In the next portion of the report the Commissioners deal at some length with the present and prospective requirements of Water London, and their bearing upon the expediency of purchase. As to the Welsh scheme of the London County Council, the Commissioners express the opinion that it will be much more costly than providing additional water from the Thames, and that it is unnecessary to incur this extra cost now, "as the supply from the Thames will be "adequate in quantity and quality up to 1941." The next matter taken up bears upon the authority by whom the purchase of the undertakings is to be effected; and the opinion is enunciated that it should not be the London County Council. The recommendation in this regard has been dealt with in the preceding paragraph. The Commissioners pass on to consider the question of conferring additional powers of control over the water supply. The suggestions made by the London County Council and the Water Committee of the Corporation of London are duly examined, and the subjects of drawing water from the Thames, the Lea, and wells, and its storage, filtration, and distribution, are discussed. The conclusion is come to that it is "unnecessary to impose any restriction upon "the taking of flood water from the Thames; and that it "may safely be left to the discretion of the Engineers of "the Companies how soon after a flood they will draw "water from the river." The Commissioners think the Official Water Examiner should have the right of entry upon the works of the Companies, to which he is now admitted by courtesy (though it is acknowledged that no impediment has ever been thrown in his way), and penalties should be imposed for disobeying his orders. Questions of control in regard to pressure, fittings, and waste are next investigated; and the opinion is expressed that the various measures of control suggested should certainly be "kept "alive in the event of purchase." The question of the practicability of connecting the Companies' systems of supply having been dealt with by the Commission in a special report, it is dismissed in a few lines. Finally, the Commissioners record their appreciation of the efficient manner in which their Secretary, Mr. Cecil Owen, has discharged his duties.

It is gratifying to find that the first report presented to the new Official Water Examiner, Mr. Charles Perrin, M.Inst.C.E., by Sir William Crookes and Professor Dewar, on behalf of the London Water Companies, bears ample testimony to the vigilance with which those who have the management of the Companies' undertakings look after the arrangements made for ensuring the supply of water of proper quality. The report is moreover of special interest, as it deals not only with the water sent out for consumption in the past month, but also with the supply for the entire year. The shorter period is soon disposed of; for all the samples taken were found to be "clear, bright, and "well filtered." Though bacteriology as applied to the examination of water is no longer recognized by the Local Government Board, the Companies' Chemists have not discontinued their practice in this regard. Last month they examined 536 samples of water; and they pronounce the general supply to have been "admirable from a bac-"teriological point of view." Not only at the end of, but throughout the whole year, signs of efficient filtration were manifest. In the case of the water of the Thames Companies, the mean of the first six months was 32 bacteria per cubic centimetre; the New River and Lea supplies containing respectively 18 and 25. During the second six months, the numbers were 22, 12, and 14; giving 27, 15, and 20 as the means for the two periods. Sir William Crookes and his colleague remark that as water containing 100 bacteria per cubic centimetre when in the clear-water wells would be regarded by the highest authorities as "properly filtered," the supply to London must be considered as "exceptionally good." As to the chemical composition of the Thames water, the quantity of organic carbon was highest in January—0·227 grain per gallon; but from June till October the figures occupied the second and third places of decimals. Dr. Thorpe, reporting to the Registrar-General, gives, on the whole, a good account of the water supply last month. The samples taken from the Thames were of "fair," and those from the Lea, distributed by the New River and East London Companies, of "good" and "fair" chemical quality. It may be gratifying to East-enders to learn that the water supplied to them was, in respect to organic matter, slightly better than any of the Thames-derived supplies.

Very definite and straightforward answers were given by Justices Bruce and Phillimore, in the Queen's Bench Division of the High Court of Justice last Friday, to the questions put to them in the special case stated in an action brought by the London County Council against the East London Water Company with respect to the use of water from fire-plugs. It will be seen, by the report which appears in our "Legal Intelligence," that the plaintiffs sought for a declaration by the Court that the hydrants, fire-plugs, and other apparatus provided by the Company, as required by statute, ought not, without the consent of the Council, to be used for any purpose other than the supply of water for extinguishing fires and for the purposes set forth in section 37 of the Water-Works Clauses Act, 1847—*i.e.*, cleansing sewers, drains, &c. In the summer of 1897, certain streets in the Company's district were under repair, and the parties who were doing the work were allowed to use the hydrants there for obtaining the water required for the operations. This proceeding, in the absence of an agreement sanctioning it, or of the consent of the Council, it was submitted was illegal. The enactments bearing upon the question in dispute are specified in our report, and therefore need not be given here. It was contended on behalf of the Council that, under the Act of 1847, they were entitled to exclusive user of the hydrants for the purpose of extinguishing fires. It was pointed out, however, for the Company, that there was nothing in any of the Acts relied upon which restricted their powers with regard to the user of the hydrants. Mr. Justice Bruce answered in the affirmative the first question put to the Court—as to whether the fire-plugs and hydrants could be lawfully used, in the absence of an agreement, for other purposes than extinguishing fires; remarking that there was nothing in the Acts cited limiting the powers of the Company in respect to the use of their own water. In the answers to the remaining three questions, his Lordship expressed the opinion that the Company could not only use the water for what purpose they pleased without the consent of the Council, but could permit other persons to do so. Mr. Justice Phillimore held the same view. He said the statutes cited imposed certain obligations upon the Company with regard to hydrants, but did not restrict, as it had been contended they did, their right to use them for any other purposes than for extinguishing fires. The Council lost their case, it seems to us, through interpreting too widely the terms of section 4 of their General Powers Act of 1894.

**Rainfall in the Past Year.**—The aggregate rainfall during the year just closed was deficient over the whole of England; the deficiency amounting to about 6 inches in the Channel Islands, 5 inches in the South of England, and 4 inches in the East and South-west of England. There was a slight excess in most parts of Scotland and Ireland. The total rainfall in the neighbourhood of London for last year was 22·1 inches, which is 2·4 inches less than the average; and during the last seventeen years there have only been three years with an excess. It was deficient in eight months; the driest month of the year being August, with a total measurement of 0·35 inch, which is the driest August for at least sixty years. During the three summer months there was a deficiency of rain exceeding 4 inches. The only months with an excess of rain were January, February, April, and November; and, except in the two latter months, the excess was unimportant.

**The Derwent Valley Water Scheme.**—Readers will probably remember that, under the provisions of the Derwent Valley Water Act of last year, the Derwent Valley Water Board are authorized to construct six reservoirs in the valleys of the Derwent and the Ashop, in Derbyshire. As the execution of these and the subsidiary works will occupy a good many years, a commencement will be made as soon as practicable. Instructions have already been given for taking the levels and surveying the sites of the first two reservoirs; and, as will be seen by an announcement which appears elsewhere, the Board are desirous of receiving applications for the position of Engineer. He will be responsible for the designing and construction of the works, and will have to reside in their neighbourhood, so as to personally superintend the whole operations. The engagement will continue (subject to the services being satisfactory) till the completion of the two reservoirs above referred to; and it may be permanent. The gentleman appointed will have a staff of assistants; and the works will be subject to the inspection of a Consulting Engineer, to be appointed by the Board, as may be desired.

# ESSAYS, COMMENTARIES, AND REVIEWS.

## GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 218.)

BUSINESS on the Stock Exchange last week was on a very moderate scale all the time. The attitude of both professional operators and the investing public in general was one of "wait, and do nothing till you see." Of course, all eyes are turned to South Africa; for upon the events there of the next few days depends the fate of all the markets. Every now and then a cheery rumour gave a slight fillip to prices here and there; but a real rise never got hold of anything hardly except Consols, and they were moved up for other reasons. Rails were much damped by evidences of heavy working expenses, which are not likely to grow lighter. The relief of the Money Market progressed another stage; for on Thursday the Bank of England rate was lowered to 4½ per cent. from the 5 per cent. rate which had lasted just a week. Indications point to even greater ease; and if we can have a 4 per cent. rate, coupled with an African triumph, the markets may have a happy future. In the Gas Department, business showed no marked disposition to increase its volume, though on one or two days things looked as if they might brisk up a bit. Changes in quotation were not numerous; but with one exception they were in the upward direction. In Gaslight issues, the ordinary began slowly to improve on its figures of the preceding week, and then moved a little faster on dividend rumours. The announcement later on that the dividend would be maintained, and nearly £54,000 added to the amount carried over, was received with satisfaction; and the closing mark was 109. The increase is all very well, but it is not enough to face a reduction in the price of gas with, coupled with present prices of coals and commodities. South Metropolitan was extremely quiet, but steady. In Commercials, a single transaction in the new, at a good average figure, was all. In the Suburban and Provincial group, nothing was touched, except Brentford, which had a rise. Crystal Palace was put back a couple of points, bringing it just in line with South Metropolitan, in advance of which it had recently been left standing. The Continental group was generally quiet. Imperial was asleep all the week until Friday, when it awoke into some activity, and gained two points. Union and European were steady and unmoved. Among the remoter undertakings, none gave a sign except Buenos Ayres, which made a good recovery. In Water, a few transactions were marked here and there at the old prices, and not a change was made in any quotation.

The daily operations were: Business in Gas on the opening day was decidedly restricted; but the general tendency was firm, and Gaslight ordinary rose ½. There was more animation on Tuesday, especially in Gaslight ordinary, which advanced 1 more. Buenos Ayres improved ½. Wednesday's dealings were almost wholly in Gaslight issues, which were steady. Crystal Palace receded 2. Thursday was about the quietest day of the week; and figures were unchanged. Friday was active and buoyant, with rising prices. Imperial advanced 2, Gaslight ordinary 1, Brentford old 2, Buenos Ayres ½. Everything was firm on Saturday; but quotations closed without further rise.

## ELECTRIC LIGHTING MEMORANDA.

**The Burden of Marylebone—Competition no Remedy—Why not Try Gas?—The Vanity of Summonses.**

THERE is no need to seek far for topical matter this week. The only important electric lighting question before the public at the present time is the wide-spread disappointment of those who have put their trust in central station undertakings for a light when they wanted it. On Wednesday last, the aggrieved customers in the parish of Marylebone of the Metropolitan Electric Supply Company made up a deputation to the President of the Board of Trade, with the object of bringing their several grievances formally before the Department. This, as the "Daily News" admiringly noticed next day, was really two wonderful events. First, some 600 persons and firms actually combined to state a grievance—"a rare example of interest in purely parochial affairs in London." Secondly, it is regarded as remarkable that they should have carried their complaint to the Board of Trade. For what could the Department do to help them in their hour of need? Simply, nothing more than offer a little sympathy and some cold advice, which might have been had with much less trouble. Mr. Ritchie obligingly told the deputation that the only real remedy for the defaults complained of was "competition," which could be provided either by a private Company or the Vestry. This, with all respect to the Minister, sounds very much like preaching to the converted, or playing to the gallery, or anything else that means telling people the very thing they most want to hear. We confess to feeling some curiosity as to who "worked" this deputation. There is actually a would-be competing Electricity Supply Company in the market for Marylebone; and the Vestry can take the job in hand any year after they have settled with the Metropolitan Company. There are thus two mutually antagonistic interests united in the simple cause of making the most of the grievance against the Metropolitan Company. Which of them was it that spurred on the Marylebone doctors and shopkeepers to pour their sorrows into Mr. Ritchie's sympathetic ear? It would take a good deal to convince us that the deputation was strictly spontaneous.

Besides, the nostrum of competition is altogether beside the mark. To suggest it as a remedy for electric light extinctions is about as practical as the proposal of certain Russian rural communes for dealing with a plague of locusts which visited this part of the world some years ago. The impoverished peasantry begged for Government help in their troubles; and when asked to name their own ideas of what should be done, all they could suggest was that agriculture should be included in the curriculum of the Imperial Universities. This was somewhat remote; but so is the notion that the electric lighting, say, of the Middlesex Hospital can be rendered less uncertain by admitting a competing undertaking into the district. If it could be asserted truly of any excluded system of electricity supply that it had never been known to break down, the argument for the expediency of admitting it would be unanswerable; but everybody knows that all systems are equally unreliable. When we say that everybody is aware of the fact, we mean all the technicians, who are ready to swear by monopoly or competition according as their own interests are affected. They have claimed so much for the advance of electric lighting that the general public might be pardoned for overlooking the circumstance that, in the one point of reliability, the method of lighting still stands exactly where it did. The public, not only of London, are beginning to awake to this truth; but the electricians, however bitterly they may fight among themselves, will try all they know to distract the public mind from the only lasting cure for occasional electric light extinctions, which is to leave the light alone altogether.

This is the common-sense remedy. It is idle for the surgical staff of the Middlesex Hospital to join the procession of those who have axes to grind at the competition mill, and make believe that competition will serve their own disinterested purposes. They are not obliged to light the Middlesex Hospital with electricity. Fashionable churches, workhouses, and other public and private establishments where there is no lack of money can indulge in the luxury of electric lighting; but they must bear the defects of its qualities. It is doubtless convenient in the casual ward to turn the button by the door and flood the apartment with light; but there must be no grumbling if the light occasionally goes out of itself without troubling the switch. It is its nature to. The "Daily News" sees that central station supply must sail very close to the wind at periods of maximum demand, if the plant and the working are to be economical. We may take a little credit to the "JOURNAL" for establishing this point against the "Electrician;" but really it is self-evident. The only difficulty lies in satisfactorily determining the coefficient of relative sufficiency of plant to possible demands. The "Electrician" admits that the present troubles of the Metropolitan and other undertakings will "serve as a warning to supply undertakers, whether company or municipal, to stay their hand when tempted to accept new consumers before they are in a position to supply them." Would our esteemed contemporary kindly define this position, and in particular say if a consulting engineer is justified in calculating upon full revenue returns from a hypothetical lamp connection 30 per cent. above the capacity of the generating plant? If not, why not?

The "Daily News" makes the same point of the excusable reluctance of suppliers of electricity to admit inadequacy of power to the demand. But this is not all. Whether plant is overworked or not, the extinctions come pretty much the same. If it is not a breakdown at the station, then it is a burst-up of a main; and the consumers' grievance is all one. Our daily newspaper contemporary very wisely opines that what the electric lighting industry wants is economical and efficient storage for their electricity; and it suggests that "the corporations should combine to offer a very tempting premium to scientific men to solve this problem." Aha! There's the rub! As the other swan would say. As if such a premium were not always on offer, amounting to wealth "beyond the dreams of avarice." The "Electrician" meanwhile remarks that the aggrieved consumers have their remedy. They can take out summonses against the Company, and get them postponed for three months. No, there is no real consolation in a summons for the man who has been denied the light he wants. If it comes to this pass, he will drop the whole thing sooner than be plagued with legal proceedings. Penalties are not for constitutional weaknesses. People in business do not require the stimulus of penalties for default to impel them to do their best for their customers, and at the same time for themselves; and the law never yet turned a weak market into a strong one. Therefore, although we have no special regard for the Metropolitan Electric Supply Company, we have no love for those who are attacking it through the Board of Trade and the Law Courts for doing what the assailants could not avoid doing themselves if similarly situated. The whole affair is cant.

**Reports of Gas Associations for 1899.**—As will be seen by an announcement which appears elsewhere, the above-named work is now ready. As most of our readers are aware, it presents in a convenient form for reference a record of the work of the Provincial Associations last year, and thus forms a companion volume to the "Transactions" of the two London Institutes. The text is followed by lists of officers and members of the Associations; and there is an index.

## GAS EXAMINATION IN PARIS.

THE photometrical programme of the London County Council, based as it is on the declaration that the existing statutory arrangements for testing the illuminating power of the gas supply of London are unsatisfactory, naturally suggests an inquiry as to how the gas consumers of other capital and important cities are protected in this respect. We have therefore taken measures for obtaining, from reliable sources, some fresh and apposite information illustrating actual European practice in legal gas testing, having regard especially to the views of the County Council of what is necessary and expedient for London. The first example must be Paris, the "City of Light," where also the duties of local government are very seriously regarded.

The relations between the City of Paris, represented by the Prefect of the Seine and the Municipality, and the Paris Gas Company are regulated by the provisions of the famous "Treaty" which bears the date of February 7, 1870. This official document is published by the Prefecture of the Department of the Seine. It will continue operative in all matters arising out of the gas supply of the French capital until Dec. 31, 1905. By chapter 2 of the Treaty, it is required that the gas supplied must be the product of coal. No other gas may be distributed without the formal written consent of the Prefect of the Seine, after deliberation by the Municipal Council. The gas must be perfectly purified; and its illuminating power should be such that, when burnt under a pressure of 2 to 3 millimetres of water at the mean rate of 105 litres (3·708 cubic feet) per hour, it shall give a light equal to that of a Carcel lamp burning 42 grammes of purified colza oil per hour.

The Company are required to find the apparatus and provide the testing places where the gas is examined daily for illuminating power and purity. The prescribed gas-burner is the Bengel, of porcelain, with thirty holes, burning the gas under the stated pressure, with a chimney 20 centimetres high, 49 millimetres diameter at the base, and 52 millimetres diameter at the top. The flame must be adjusted to equal the light of the Carcel, used under the conditions specified in an instruction of Messrs. Dumas and Regnault, annexed to the Treaty. This instruction resembles in form those of the London Referees. It bears the date Dec. 12, 1860; and has never been varied one jot or tittle. It describes, with illustrations, the Carcel and the Bengel (or as it is here spelt Benghel) burner, giving all the measurements serving to standardize the apparatus. The Bengel burner is a simple argand without any cone, but with the lower open part of the chimney gallery closed by a sheet-metal apron, pierced with air holes. Before being used for testing, every burner must be compared with the sealed standards.

The operation of making a test comprises the lighting and the measurement. The lighting of the Carcel is quite a business. A new wick is to be used, cut to the level of the wick-tube. These wicks have to be kept dry, in a box of quicklime if necessary. The lamp is exactly filled with oil, and lit with the wick turned up to 5 or 6 millimetres high. Then the chimney, which is shouldered and capable of being slid up and down in its socket, is mounted in place. The wick is next turned up to its full regulation height of 10 millimetres, and the chimney adjusted so that its shoulder is 7 millimetres above the level of the wick. Thus the lamp should burn 42 grammes of oil per hour; but it is allowed a variation of 4 grammes above or below the standard rate without losing its legal value. Both the lamp and gas must be lit and allowed to burn full on for half-an-hour before the test is made.

It will not escape notice that complete reliance is placed upon the performance of the Carcel, after adjustment, with the sole guarantee of the rate of consumption of the oil. All is correct when the lamp burns 10 grammes of oil for 25 litres of gas burnt by the Bengel. The two lights are equalized by regulating the flow of gas by means of a micrometer cock, which must be attended to throughout the duration of the test, marked by the seconds alarm clock. Three observations are made, at half-hour intervals, and the mean result taken. The normal rate of consumption of the lamp being 42 grammes of oil per hour, and a consumption of 10 grammes being the test quantity, it follows that the period of every observation should be 14 min. 17 sec. The seconds clock shows the actual time occupied in burning the 10 grammes of oil, from which it is ascertained whether the lamp is functioning within the legal margin. The test meter is verified every eight days, in the presence of an agent of the Company. An error of 1 per cent. in registration is permitted, compared with the standard holder. The purity test is only for sulphuretted hydrogen by acetate of lead paper.

All testing apparatus is formally taken over from the Company by the City Engineers, and can only be used after it has been verified and checked by the agents of the City and those of the Company. The testing-stations are to be at the district distributing stations of the Company, or in the vicinity, and in rooms of which the agents of the City alone have the keys. The district stations selected for the purpose are chosen, with the consent of the Company, about the middle region of the distributing system supplied by the gas-works corresponding with the district station. There are to be as many testing-stations as the Municipality thinks fit to require; but at least one for every gas manufacturing station, and two for the most important.

The testing is to be done between the hours of eight and eleven at night. Every day an order-sheet, forwarded by the Director of Highways of the City of Paris to the gas examiners, designates the stations at which tests are to be made that evening. The number of tests should be the same for all the works. The District Superintendent, or one of the Engineers of the Company, has a right to be present during the testing, and to take note of the results; but he is not to interfere with the conduct of the operations, for which the testing officer is solely responsible. If the gas consumption, which ought to be 25 litres, as already stated, should exceed 27·50 litres, the fact must be immediately notified to the Prefect of the Seine and the Company.

The results are still further averaged: The mean of the tests of every month should be equal to 25 litres in round numbers. To arrive at this mean, to every works is assigned at the beginning of the year a co-efficient proportional to the mean fraction representing the share of this works in the total output for the public lighting. When the mean for a month is above or below the normal, a report is made in the following month of the same quarter of the amount of compensation due by the Company or by the City. At the end of every quarter, the account of the proportional compensation for all the works is cast; and if there is a deficiency, the Company pay to the City the value of the missing light, based on the price of gas supplied for the public lighting (15 centimes per cubic metre) less the octroi-duty of 2 centimes per cubic metre, and on the mean monthly consumption of the same streets for the corresponding period. Over the whole year the Company pay damages for light not supplied, thus determined, at the price or value of the difference for the first two quarters. If a deficiency occurs again, in either or both the two latter quarters of the same year, the damages are doubled.

These preceding provisions are only put in force if the deficiency exceeds 10 per cent. This figure corresponds to the margin allowed in the testing—from 25 to 27·50 litres consumption to the Carcel—before an actual default is registered and notified. Within this limit, no deduction for bad light on the price of gas supplied can be demanded. If the figure is exceeded in the tests for two consecutive nights, further proceedings are to be taken after a delay of five days, in the shape of a check testing in the presence of agents of the City and the Company. In case of disagreement, there is an appeal to a Government Engineer, named for this duty by the Council of the Prefecture at the commencement of every year. From the day when the deficiency of illuminating power in excess of the 10 per cent. margin is denounced by the City to the Company, if it is repeated ten days following, or during any fifteen days of the same month, the Company are mulcted in five times the value of the light not furnished. This forfeiture applies both to the public lighting and to the private consumption. Exception is also allowed for cases of *force majeure*, provided that when the Company are aware of any causes likely to injuriously affect the illuminating power of the gas, they are to immediately notify the same to the Prefect of the Seine. We cannot recall an instance of forfeiture by the Company under these articles. The results of the testing are made public four times a year, in a manner determined by the Prefect. There are no constitutional means of altering these provisions while the Treaty lasts.

A number of printed forms, issued by the Prefecture, provide for the returns to these orders. The first is a sheet to be entered up with all the results of a day's testing. The first column gives the name of the gas-works, followed by the testing-station or stations at which its gas is examined. There are seven works, and twelve testing-stations. Thus, gas sent out from La Villette is tested: (1) At No. 208, Rue du Faubourg St. Denis; (2) at No. 33, Rue de St. Quentin; (3) at No. 27, Rue du Château-d'Eau. The figures are entered by the Inspector of Gas Lighting; countersigned by the Engineer of the General Lighting Service; and attested and forwarded to the Administration Director of the proper department, by the Chief Engineer of Streets and Lighting. Another return is for the results of occasional tests, made at the same stations during the daytime, which is done twice a month; but as these results have no legal force, they are not reckoned in with the lawful ones. A third paper gives the "co-efficients" of the different works; and is for recording the quarterly averages. Besides these office papers, every gas examiner enters his own work in forms from which the average returns are compiled, having special forms for "bad reports." Lastly, a form of authorization is filled up for every agent of the Company who is admitted to a testing-station.

All these regulations are rigorously carried out. It will be observed that the testings are meant to be a check upon the gas sent out from the different works, taken at a point midway in the district. With this object, the service is taken whenever possible from a leading main. In practice, a testing-station is never put at a less distance than one kilometre from the works whence the gas is supplied, though there is no law for this regulation. The service pipes to the testing apparatus are special to this use, and are not metered in the ordinary way. The only meter used is the test meter. The gas examiners are nominated by the Prefect of the Seine, acting as Mayor of Paris. They are paid by the Municipality, at 5 frs. or 4 frs. per night's test, according to class. The staff numbers 22, whereof ten have by seniority attained the first class, who are paid 5 frs.; seven belong to the second class, at 4 frs.; and five are extra men at the lower rate. Testers are allowed in addition 60 centimes a night for omnibus fares; and they go the complete round of all the stations in turn.

## DEATH FROM CURRENTS OF ELECTRICITY.

THE recent accidents due to electric currents at Bradford, Middlesbrough, and Bolton, have led Dr. W. S. Hedley to deal, in the "Electrical Review," with "The Cause of Death from Electric Lighting Currents," considered not only in relation to the electrical question of prevention, but to the medical one of "first aid." As to the latter, he says it must be regretfully confessed that some simple, ready, and effective means of resuscitation after electric shock are still wanting. Some six or seven years ago D'Arsonval expressed the opinion that persons suffering from such shock should be treated as the apparently drowned—that is to say, by artificial respiration, begun early and patiently continued. Dr. Hedley says that in this respect there has been practically no advance, not because the subject has been simply left alone by medical men and physiologists, but because, from the point of view of treatment, there has not as yet been any practical outcome of their labours. The latest contribution to the physiology of death by electric shock reaches us in the form of a painstaking experimental investigation by Dr. Robert Cunningham, of New York; but, unfortunately, he has nothing better to offer in the way of treatment than what is admittedly an impracticable procedure. As an inquiry into the mechanism of death by electric shock, however, his experiments are interesting and instructive. Dr. Hedley tells us that, by means of blood-pressure tracings and other tests on dogs, with "the continuous finely pulsatory 116-volt current," he has satisfied himself that death from electric lighting circuits is due to sudden arrest of the circulation from fibrillar contraction of the heart; and in rare instances (when an electric current of considerable intensity and duration traverses only the cerebro-cervical portion of the nervous system), death may take place by asphyxia.

In order to assign a proper value to these views, Dr. Hedley points out the utility of bearing in mind what has been said and done by previous experimenters. He reminds us that, in 1894, D'Arsonval considered that an electric current produces death either (1) by the disruptive action of the current mechanically altering the tissues; or (2) by the occurrence of a central paralysis of respiration constituting a special form of asphyxia. Dr. Tatum, of New York, experimenting in 1890, came to the conclusion that such currents kill by acting chiefly or entirely on the actual substance of the heart itself. Dr. Lewis Jones, a few years later, considered that death begins at the heart, and that the action of the current is upon the heart muscle rather than upon any of its nervous mechanisms. Drs. Oliver and Bolam, following in the wake of these experiments, subsequently arrived at exactly the same conclusion. Dr. Bleile, of the Ohio State University, was of opinion that death in such cases is entirely due to the fact that the current produces a contraction of the arteries through an influence on the nervous system—that is to say, through an effect on those nervous centres which control the diameter of the arteries; and that a constriction of the arteries so produced throws in an impediment to the flow of blood which the heart is unable to overcome. The late Sir George Johnston thought that the fatal obstruction is not in the systemic arterioles, but is due to a constriction of the pulmonary arterioles—the latter being excited to contract by the entirely deoxygenized blood. Dr. Hedley himself has, in the "Electrical Review" and elsewhere, expressed the opinion that death may be brought about in some instances by arrest of respiration, and in others by sudden and primary stoppage of the heart's action.

This subject also has been investigated by MM. Prévost and Batelli, who, in March last, found that the electric current threw the heart into the condition known as *delirium cordis*, or fibrillar contraction. Dr. Cunningham, although of opinion that death sometimes occurs from asphyxia, holds that death by direct action on the heart is vastly more frequent, not because the muscular substance has been killed or paralyzed by the current, but probably "because the balance of the intra-cardiac co-ordinating mechanism has been destroyed." He considers that the instantaneous and total extinction of the arterial circulation which the blood-pressure tracing shows, results from a "practically instantaneous cessation of the co-ordinated rhythmical contractions of the ventricles of the heart." In his experiments, he found that usually a current of from 0·6 to 0·65 ampère was sufficiently strong, when passed across the chest, to kill the majority of the dogs, whether large or small. He thinks that some other factor "apparently residing in the heart, and probably physiological in nature," is also at work. Dr. Hedley points out that the latter remark would probably apply to any kind of injury inflicted on any kind of animal. It is obvious that the effect of any form of violence to a living being must to some extent be determined by the physiological resistance of the individual. The above experiments tend to prove: (1) That a dog may be killed by passing a strong continuous current for a more or less lengthy period (1·1 ampères for a minute) through the brain and upper part of the cervical spinal cord, the death in such a case being due to asphyxia; and (2) that a weaker current for a shorter time (0·3 ampère for six seconds) traversing the heart will, by sudden and permanent stoppage of the heart, produce death. It is in this way that death usually occurs. In such cases the central nervous system dies from anæmia.

Dr. Cunningham is of opinion that death by electric shock is not instantaneous, inasmuch as one nervous centre at least—viz., the respiratory—"continues to act more or less perfectly for some moments after the cessation of a lethal current.' Having seen three cases, and read of sixteen others, of recovery after electric shock, there seems to be "ample time before loss of consciousness occurs for the recipient of the shock to become fully aware of the fact that he is, or has just been, in contact with an electric current." Generally speaking, the sensation was described in these cases as not particularly painful, and resembling that produced by a strong medical coil. Usually a sensation of "tremendous pressure across the chest is also felt." Dr. Hedley says the sequence of events in such cases seems to be somewhat as follows: As the accidental contact with the live wires, rails, brushes, &c., is made, more or less pronounced general muscular contractions immediately occur. After a deep inspiration and expiration, respiration may perhaps stop, but soon begins again. A temporary arrest of heart action and fall in blood pressure is also immediately manifest. In slight cases, the normal heart beat is soon recovered; but more or less syncope frequently occurs, which disappears on the restoration of the circulation. Where contact has been made with conductors carrying currents of considerable intensity, duration, and electro-motive force, and the result does not prove fatal, "possibly none of the current, or undoubtedly but a very small portion of the current, traverses the heart." But "when the current through the body is a strong one—for instance, one of from 1 to 8 ampères—and passes through the heart," fibrillar contraction ensues, and spontaneous recovery is in the highest degree improbable.

## RECENT PUBLICATIONS.

*Good Citizenship:* Twenty-three Essays by Various Authors on Social, Personal, and Economic Problems and Obligations. Edited by the Rev. J. E. Hand. (George Allen).

It has, on occasion, been the duty of the "JOURNAL" to comment upon, and to lament, the indifference towards, and ignorance of, the serious industrial and economic problems of the day displayed by the Church. It therefore affords us especial pleasure to welcome this book, which is an attempt on the part of some of the clergy—assisted by lay writers—to remove that indifference and enlighten that ignorance. The Editor, it will be seen, is a cleric; a special preface is supplied by Canon Gore; and there are some dozen other prominent churchmen included in the list of writers. The authors are, in general, chosen for their special knowledge of their subjects, and have been given a free hand, coupled with individual responsibility for their articles. The bond of union—the common purpose—is stated to be to show "that a worthy citizenship must have its basis on a Christian and ethical foundation, and that all classes of men should apply their religious motives to the purposes of citizenship;" the essays being further intended to call the attention of citizens to the many problems with which it is their duty to cope, and to afford some guidance to the would-be-worthy citizen as to the direction in which he may find their wise solution. It is not a matter of surprise that the authors have been infinitely more successful in pointing to the questions than in supplying the answers. It is so easy to see that "something is wrong," so difficult to say how to put it right. We think that not a few of the writers have missed the object of their work, because they have, strange to say, failed to see that so many of the "wrongs" can never be righted from without, but that the one thing needful for the solving of these problems, and for the removal of many of the sources of human misery and suffering, is the elevation of the nation through the better understanding and fulfilment of his duty by the individual. This is, indeed, more clearly seen by the Editor, who points out, in his very able introduction, that "improvement in the government and in the governed must go together. Neither can move far in either direction without dragging the other with it. The driving-wheel of all human machinery is CHARACTER;" and, while men may and certainly will differ as to what reforms may be needed, all can agree that "what is first needed is an intelligent citizenship to appeal to, a public opinion based on sound knowledge, on careful study, and on high moral principle." We much prefer in this book those essays the authors of which content themselves with pointing out conditions of society which are obviously contrary to humanity and morality, or with indicating spheres of work in which a citizen may do useful service and where high moral principles would work revolutions, to those whose authors merely seize the opportunity to air their own pet schemes of reforms. If only citizens can be stirred to the duty of studying the problems dealt with in this book (and that we take to be its prime object), they will find plenty of experts ready with schemes designed—whether calculated or not—to solve those problems.

To illustrate our preference, we may mention two essays that, coming next one another, afford a striking contrast; the one fulfilling, the other missing, its purpose. Mr. J. T. Dodd's paper on "The Poor-Law" is admirably suited to instruct the ignorant or thoughtless citizen in the valuable and difficult character of the work that he might undertake as a Guardian of the Poor; setting forth the powers and duties of the Guardians, and showing to what a large extent the humane treatment of the destitute and aged depends upon the conscientious performance of those

duties and the just exercise of those powers by the citizens who hold the office. The essay on "Old Age Pensions," by Mr. G. L. Gomme, on the other hand, is certainly not calculated to interest or inform the supine reader. There is, in fact, no attempt at an explanation of the problem. The short ten pages consist merely of an advocacy of two little plans of Mr. Gomme's—one of enforced enlistment for the able-bodied beggar (the beggars' brigade and the criminals' corps would, indeed, be valuable additions to the British army!), the other of providing funds for old-age pensions by taxing enclosed common lands. We can only say that the citizen who previous to reading Mr. Gomme's article was ignorant of the facts of the gigantic problem of the aged poor, and of the history of the movement in favour of State provision of pensions therefor, would simply wonder whatever the author was talking about.

It is obviously impossible to compress into a notice of anything like wieldy dimensions, an adequate review of a book comprising twenty-three essays upon as many subjects, all of them of great interest to the student of present-day Social and Economic problems, and most of them subjects of keen controversy, or to make an exhaustive examination of the opinions expressed by the various authors. We must be content to mention—and that very briefly—the essays dealing with subjects of the most direct interest to readers of the "JOURNAL." Chief among these come Mr. J. A. Hobson's two papers on "Capital" and "Labour." Mr. Hobson is a well-known and able writer on Economics; and these essays have the merit of being written thoughtfully and with distinction. The writer has, indeed, therein made good his claim to be considered a "disinterested student of industrial facts and laws." Recognition of these merits in the writer does not, however, imply agreement with his conclusions, which, in fact, we are, in more than one instance, utterly unable to accept, and which, since Mr. Hobson's essays will probably constitute the foundation of not a few sermons, it is necessary to dispute. While effectively destroying the claim of Labour to the "whole product of labour," Mr. Hobson yet believes that the worker has a further claim upon the product of his handiwork than the wages paid him in exchange.

> The workers who are obliged to live round a factory, who spend the best part of their lives within its walls, give out their personal skill and energy in tending its machinery, who are even more deeply interested in a success or failure, which means food or starvation, than the capitalist, to whom it means riches or poverty—these people have as real a property, as true an ownership, in the business as the men who bought and set up the machinery. Legally, we know well they have no claim; they may have laboured for generations in the mill, and the caprice or self-interest of the owner may throw them on the street. This purely legal view of property so dominates the mind and imagination of most people, that they cannot bring themselves even to admit that the muscle, skill, industry, and character of a body of workers, which have helped to build up and carry on a successful business, involve any rightful property in that business. Yet this view begs the whole moral question; it assumes that a legal position is morally sound, whereas that is the very issue. . . The fact that the employer can sell the name, the goodwill, and the premises, or clear away every stock and stone of the building, is merely testimony to an immoral interpretation of ownership.

Really, this is simply fantastic, sentimental nonsense. The idea that if you employ a master-builder to build you a house, for the materials of which you pay him, for the designing of which you pay him (or the architect), for the labour expended upon the erection and the supervision of the erection of which you pay the bricklayers, carpenters, and others (through the builder), yet finally, that builder and those workmen have the moral right to a part ownership of that house by reason of the muscle, skill, and industry put into its construction, needs only to be stated to be destroyed by its own absurdity. Yet where is the difference between the builded house and the built-up business? If a worker have some property in the product of his labour over and above the wages paid him, it matters not what that product be, or whether he work in a mill or for a private person. If the wages paid be insufficient for the worker to provide thereout for his old age, the fault lies in the rate of wages, not in the legal theory of ownership. We are certainly strongly in favour of employers adopting schemes for pensioning their aged workmen; but this is only the payment of deferred wages, not the recognition of a claim to part-ownership of the business. That can only be obtained by the investment of wages in the concern.

Mr. Hobson proceeds to argue in favour of State control of capital—of "public enterprise" in lieu of private—and supports his contention by the statement that "it is evident that no man in society is strictly capable of self-support, even as regards the production of the bare necessaries of physical life for himself and his family. At every step he is dependent upon the support of the entire industrial community, and, in a still closer way, upon that of the fellow members of his trade and locality." If this were merely intended to mean that, in the complicated conditions of modern life, no man can live solely on the results of his labour, it would be accepted as a truism; but when it is seen that Mr. Hobson holds that the working-classes do not receive for their labour an equivalent enabling them to be self-supporting, we must say that in our opinion he entirely fails to prove his contention. Mr. Hobson apparently confounds the "means of self-support" with the possession by everyone of an equal share in the wealth of the community. Gas-manufacture is certainly one of the "large mechanical routine industries" which Mr. Hobson would like to see worked by public enterprise; but gas workers are quite capable of providing more than the bare necessaries of physical life for themselves and their families.

We are conscious that we have only been able to deal very inadequately with Mr. Hobson's arguments; but we have already exceeded the space we intended to devote to this review. We can only now mention that Mr. Gomme has a second article—on "The Municipality"—in which he proposes to abolish the word "profit" from municipal finances, only, however, to substitute that of "taxation." Consumers of gas, and users of telephones or trams are to be charged more than cost price for those necessities, in order to provide a source of indirect taxation (a plan likely, of course, to lead to economical municipal administration!). Miss Mona Wilson writes on "Factories and Workshops," and incidentally negatives much of the impracticable advice given by the Rev. J. Carter in his paper on "The Economic Duty of the Consumer;" while other writers deal with other aspects of social life which are beyond our scope to review. Of the whole, we must say it is more interesting than instructive, but is valuable as evidence of a desire on the part of the Church to pay greater attention to its practical duties.

*Signalling across Space without Wires.* By Oliver J. Lodge, F.R.S. ("Electrician" Printing and Publishing Company, Ltd.)

This is the third edition of Professor Lodge's description of the work of Hertz and his successors in connection with the above-named subject. The first portion of the book consists of the revised notes of a lecture delivered by Professor Lodge before the Royal Institution on June 1, 1894; and this is followed by an account of the later applications of Hertzian wave experiments to wireless telegraphy. In this connection, Popoff's demonstration in 1895, Slaby's overland experiments a few years later, and the more recent exhibitions of Marconi are described. There are seven appendices, two of which are devoted to the photo-electric researches of Drs. Elster and Geitel and Professor Righi. Those of our readers who desire reliable information on this interesting subject will find it in the book under notice; the name of Professor Lodge being an all-sufficient guarantee for the accuracy of the contents.

## WATER BILLS FOR 1900.

THE following Bills of Municipal Corporations and Local Authorities relate wholly or in part to water supply.

The Airdrie, Coatbridge, and District Water Trust Bill proposes to constitute and incorporate a Water Trust for the Burghs named, and parts adjacent, in the county of Lanark. The Airdrie and Coatbridge Water Company supply the district, and last year obtained an Act in which the promotion of this purchase Bill was arranged for on the customary terms. The constitution of the Trust is prescribed, and the appointment of officers provided for. Members of the constituent Authorities are excluded from office under the Trust. The amount of the purchase price is to be ascertained by arbitration under the Lands Clauses Acts, and is to cover the reasonable costs of obtaining the Company's last Act, the costs of winding up the Company, and compensation of the officials. The distribution of the purchase money is to be in accordance with a scheme to be framed by the Directors and approved by the proprietors. Objectors are to have a right of appeal to an arbitrating counsel. The District Committee of the Lower Ward of Lanarkshire are to have power to purchase the portion of the water-works in their district. Water is to be supplied by meter for other than domestic purposes at prices varying from 7d. to 5d. per 1000 gallons, according to quantity. A sliding scale is proposed for making the price of metered supplies depend upon the domestic water-rate for the time being. Additional water capital to the amount of £50,000 is required, repayable in sixty years. The money may be raised by the creation and issue of redeemable stock under the Local Authorities Loans (Scotland) Acts, 1891 and 1893. The Trustees may also borrow from their bankers on current account any sum not exceeding one-half of the approximate amount of their yearly revenues. A professional auditor is to be appointed and paid.

The Barnsley Corporation Bill is to enable the Corporation to make deviations in constructing the lines of pipes authorized by their Water Act of 1896, and to take over certain obligations of the Corporation of Sheffield under an Act of 1896. Easements only for the proposed deviations may be acquired. The Corporation of Sheffield are to pay the extra cost of one pipe-line deviation; and are to relinquish to the Barnsley Corporation the right to make the Knoll Brook works authorized in 1896. The period of time for this work is extended. Agreements between the Corporations are to be concluded in furtherance of the objects of this part of the Bill.

The Bury and District Water-Works (Transfer) Bill is to constitute and incorporate a Joint Water Board, consisting of representatives from the Councils of the boroughs of Bury, Haslingden, and Rawtenstall, the urban districts of Radcliffe, Ramsbottom, Little Lever, Whitefield, and Tottington, and the rural district of Bury. The Board are to take over the water undertaking of the Bury Corporation. The constitution of the Board is duly set out. Members of the Board are not to have any interest in the contracts of, nor draw any emolument from, the work of the Board, except as shareholders of a company, and

then not to have any vote in the matter. The Chesham reservoir at Bury is to remain the property of the Bury Corporation. The capital sum of £90,000 is to be withdrawn from the indebtedness of the Corporation, and charged upon the Board. Other provisions are made for adjusting the finances of the undertaking. All surplus profits on the supply are to go in reduction of the domestic water-rate. The price of water supplied for public purposes is to be settled by the Board, and to be uniform throughout their limits. Officers are to be continued. The unexhausted water capital powers of the Bury Corporation are to be exercised by the Board.

The Cambridge Corporation Act contains a part relating to water. It proposes that the undertaking of the Water Company shall be transferred to the Corporation on such terms and conditions as may be agreed upon or be determined by arbitration under the Lands Clauses Acts. The rates for domestic supplies are to range from 5 to 4 per cent. Power is to be taken for borrowing the requisite amount of money for buying out the Company, to be repaid in sixty years. Surplus water profits are to go to the district fund.

The East Stirlingshire Water Bill is to empower the Eastern District Committee of the County Council of Stirlingshire to construct water-works for the supply of their district. The proposed works comprise an intake in the Buckie burn and a reservoir in the parish of St. Ninians, with a pumping-station in the parish of Slamannan, and a number of subsidiary works. The waters of the Buckie burns are to be taken, subject to the provision of compensation water. The works are to be completed in from five to ten years. Special arrangements are to be made with the Bonnybridge eastern and central water districts; and certain distributing plant belonging to the Falkirk and Larbert Water Trustees is to be purchased. A clause deals with the compulsory supply of water for domestic purposes within the district. The District Committee are to lay the mains, and compel owners and occupiers to provide service pipes and take the water. Domestic supplies are strictly defined. Where metered supplies are enforced, the domestic water-rate is not to be levied; but the District Committee must elect on which basis to charge. The County Council are to pass the rates made by the Committee; and may levy a public water rate of not exceeding 3d. in the pound. The County Council are to finance the Committee until they are in receipt of revenue.

The Edinburgh District Lunacy Board Bill is to empower the Board to make water-works in the county of Linlithgow, comprising two storage reservoirs on the Brox burn, and an intake on the Linen Faulds burn. The water rights of the Bathgate District Committee are protected. Certain lands are to be acquired in order to protect the sources of supply from being polluted. The works are to be completed within eight years. The Board desire power to supply water to the Asylum or elsewhere in six parishes, and beyond them in bulk.

The Exmouth Urban District Water Bill is to authorize the District Council to purchase the undertaking of the Company by arbitration under the Lands Clauses Acts. The officers are to be compensated. The rate for domestic supplies is to be 6 per cent., with special rates for shipping and for metered supplies. The undertaking is to be improved at an estimated cost of £4000.

The Falkirk and District Water Bill is to provide for an additional supply of water to the burgh of Falkirk. A reservoir is to be constructed on the line of the stream known as the Earl's burn; and a second similar work on the Little Denny burn. Certain water-works authorized in 1896 are to be abandoned. Compensation water is to be discharged into the channel of the impounded water courses under particular guarantees. The additional works are to be completed within ten years. Main-laying powers are to be taken. The Trustees require to borrow £110,000 for the purposes of the Bill. Areas are to be added to the limits of compulsory water supply.

The Halifax Corporation Bill contains a part relating to Water. Certain lands in the drainage area necessary for the protection of the source of supply are to be acquired and held. Such lands may be leased under suitable conditions. Occupied houses in the borough without a proper water supply are to be dealt with summarily as nuisances. The sum of £20,000 is required for the purchase of water lands.

The Hamilton Burgh Bill is to amend an Act of 1878, and make the public water-rate leviable on all lands and premises within the limits. Underground gas and water pipes are to be charged one-fourth. Water and gas rates are to be primary charges on bankrupts' estates.

The Hemel Hempsted Corporation (Water) Bill is to make further provision for the purchase of the Hemel Hempstead water undertaking by the Corporation. The water-works are in the hands of the Hemel Hempstead Water-Works and Laundry Company, Limited, who obtained a Provisional Order in 1896. It is proposed that the Company should sell their undertaking to the Corporation at a price to be determined by arbitration under the terms of the Arbitration Act, 1889. The Corporation will not supply at constant pressure for a year after the transfer. Additional water capital to the amount of £15,000 is required, repayable in sixty years. Surplus profits are to be divided between the Corporation and the outlying area in rateable proportions. The share of the latter is to be applied in reduction of the rate; while the former may be so applied or diverted to the district fund in the discretion of the Corporation.

The Menstone Water-Works (Transfer) Bill is to authorize the Rural District Council of Wharfedale to purchase the undertaking of the Menstone Water-Works Company, in accordance with the terms of the Company's Act of last year. The amount of the purchase money is to be determined by arbitration under the Lands Clauses Acts with reference to the purchase and taking of lands otherwise than by agreement; but the arbitrator is not to have regard to the fact of the Company being incorporated by Act of Parliament. The Council are to pay the taxed costs of obtaining the Company's last Act, with 4 per cent. interest from the beginning of the present year; and also the taxed costs of the winding up. Officers wishing to retire are to be compensated with a payment of two years' salary. The Council are to give notice to treat within three months. Additional water capital to the amount of £5000 is required, repayable in sixty years. Surplus water profits may be carried to the credit of the special expenses account of the contributory place of Menstone.

The South Essex Water Board Bill is to constitute and incorporate a Joint Water Board, consisting of representatives from the Councils of the urban districts of Barking Town, Grays Thurrock, Ilford, and Romford, and the rural districts of Orsett and Romford, all in the county of Essex, and to vest in such Authority the undertaking of the South Essex Water-Works Company. The constitution of the Board is defined, with curious provisions respecting disqualifications. Under certain conditions, the Brentwood Urban District Council and the Billericay Rural District Council are to become constituent Authorities. The arbitration is to be under the Lands Clauses Acts. New works are contemplated, including wells and pumping-stations at Roydon in the district of Epping, at Nazeing, and also at Netherall and other places named. These works are 34 in number; and are to be completed in fifteen years. Additional capital to the amount of £950,601 is allocated to the purchase of land and the execution of new works, and £306,000 for the extension and improvement of the undertaking. Surplus profits are to be applied in the reduction of the rates. The costs of the Bill and of the opposition of constituent Authorities to the South Essex Water Bill, 1899, are to be paid by the Board out of moneys raised under the Act.

The Spalding Water Bill is to authorize the Urban District Council of Spalding to acquire the undertaking of the Spalding Water-Works Company, originally incorporated in 1863. In 1890, power to purchase the undertaking was acquired by the South Lincolnshire Fen Water Company; but the power has remained unexercised, and is now to be repealed. The limits of the Bill are the urban district of Spalding. The arbitration is to be under the Lands Clauses Acts. The supply need not be constantly laid on under pressure. Rates for domestic supply are to be 8 and 7 per cent., with 8 per cent. for inns. Supplies for domestic and other purposes may be by meter, according to a scale of minimum charges. Additional water capital to the amount of £10,000 is required. The powers given to the District Council under the Bill are to be cumulative.

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**An Unsuspected Cause of Rust.**—A writer in the "Scientific American" mentions the case of a highly-polished screw-cutting lathe becoming completely covered with a coating of rust under conditions which seemed to preclude all possibility of the presence of damp. Investigation, however, revealed the fact that for several days prior to the oxidation a gasoline furnace had been in prolonged use by some plumbers for the purpose of melting pots of lead for making leaded joints. This furnace had been placed upon the floor, 10 or 15 feet from the lathe, with no chimney or other means of ventilation. The water vapour generated by the combustion of the gas from the gasoline found a condenser in the polished steel of the lathe, the surface of which it immediately converted into rust. The use of ordinary illuminating gas in an unventilated building will cause a certain amount of vapour to condense in a similar way; but the evil may be minimized, if not entirely obviated, by the use of incandescent mantles.

**Coal Mining in South Russia.**—Before the members of the Manchester Geological Society a short time since, Mr. J. Crankshaw, F.G.S., read a paper on "Coal Mining in South Russia," dealing chiefly with the coal mines of the Jusowo district, which is the centre of the bituminous coalfield of the Donetz basin. He said few of the pits were more than 200 yards deep; they were rectangular in shape, and about 13ft. 6 in. by 5 feet, lined with timber, with one or two partitions. The workable seams varied in thickness from 72 to 15 inches; but the average was about 24 inches. The coal was generally of a good appearance, light in weight, with a fibrous fracture, and was described as "fatty" coal. Some of the seams yielded coal with a high percentage of gas; but it was also rather high in sulphur—ranging from 0·77 to 2·5 per cent. A large proportion of slack was produced; but this did not seem to be of much importance, as the same price was obtained for the coal, independently of size. The cost of getting and carting was equal to 58½d. to 69¾d. per ton, put in railway trucks. The selling price of the coal was equal to 8s. 1d. to 11s. 8d. per ton at the time of the author's visit, and had gone up considerably since. The average profit was quite 4s. per ton. Every encouragement was being given to schemes proposed by Englishmen and to the employment of English capital.

## PERSONAL.

The estate of the late Lord FARRER has been valued at £119,290, including personalty of the net value of £102,936.

Mr. CHARLES MEIKLEJOHN, Engineer and Manager of the Rugby Gas-Works, has been installed W.M. for the present year of the Lodge of Rectitude, No. 502.

Mr. GEORGE SWINBURNE, Assoc.M.Inst.C.E., of the firm of Messrs. J. Coates and Co., Engineers, of Melbourne, and Managing-Director of the Colonial Gas Association, Limited, has been elected Director of the Metropolitan Gas Company of Melbourne.

We have pleasure in announcing that Dr. H. BUNTE, Professor at the Technical College at Carlsruhe, and General Secretary of the German Association of Gas and Water Engineers, has been created a Privy Councillor. He is well known to our readers as the Editor of the "Journal für Gasbeleuchtung," and the author of many valuable technical papers.

Mr. WILLIAM CROXFORD, who was for many years Secretary to the Brentford Gas Company, has been obliged, through failing health and advancing years, to resign that office. He is succeeded by Mr. WILLIAM MANN, the former Accountant to the Company. Mr. JOHN CROXFORD, a nephew of the retiring Secretary, has been promoted from the post of Cashier to that of Accountant. The newly-appointed Secretary is the eldest son of the late Mr. William Mann, who was Chief Engineer of the City of London Gas Company at Blackfriars, until that Company's amalgamation with the Gaslight and Coke Company in the year 1870.

## OBITUARY.

The death occurred on the 14th inst., of Mr. C. PALLISTER, J.P., Chairman of the Northallerton Gas Company. Deceased was one of the founders of the Archer Lodge of Freemasons, No. 1337, at Northallerton, and was twice W.M.

The death is announced of Major ELIOT HODGKIN, who took a prominent part in the management of the Pulsometer Engineering Company, Limited, from its formation. Deceased met with an accident in the hunting field on the 8th ult., and succumbed to it last week.

At the age of 64, Mr. THOMAS ROBERTS passed away at Portmadoc last Saturday week. The deceased gentleman was well known throughout North Wales; and in South Carnarvonshire and Merionethshire he was connected with several water-works in the capacity of Engineer.

We regret to record the death, last Wednesday, from chronic bronchitis, aggravated by an attack of influenza, of Mr. CHARLES BELL, Manager of the Hemsworth Gas-Works, of which Messrs. Clayton, Son, and Co., Limited, are the owners. Deceased was highly respected and held in great confidence by the firm.

We regret to have to announce the death of Herr JULIUS QUAGLIO, of Berlin. He was one of the pioneers of water-gas manufacture, and was responsible for the plant first erected at Frankfort-on-the-Maine and Essen. He became widely known in connection with a pamphlet which he wrote entitled "Water Gas, the Fuel of the Future."

The death is also reported of Herr C. F. RAMMELSBERG, at Berlin, on the 28th ult. Deceased was a Chemist of cosmopolitan repute, best known for his knowledge of mineralogy; but he had also made valuable researches on the constitution of the double salts of ammonia, of double cyanides, and of lead-chamber crystals. He retired in 1891 from the position of chief of one of the chemical laboratories of the University of Berlin.

# NOTES.

### Cinder Concrete Floors.

Tests of a very cheap cinder-concrete flooring are reported from Chicago, in connection with some building operations in which this method of fire-proof construction was used. It appears that when the floors were made, doubts arose as to their strength. And little wonder, for the construction appears to be of the lightest description. The main framework of the floors was 12-inch rolled iron beams, at 6 feet centres. Between these beams the concrete arches were turned; the span being 5 ft. 10 in., while the rise was 8 inches, and the material 3 inches thick at the crown. The concrete was composed of 1 part of Portland cement, 3½ parts of coarse sand, and 6½ parts of cinders or small coke. Buried in this concrete was a sheet of No. 20 B.W.G. wire cloth, stiffened by $\frac{7}{16}$-inch rods woven into it every 9 inches. The rods ran transversely to the floor beams; and being cut to the length of the arch, were simply sprung into their place between the girders. It is not reported how the wire cloth and its rods were placed; but it may be imagined that after half the thickness of the concrete arch had been laid on the centering, the iron reinforcement was put in and the rest of the concrete laid over it. Twenty-seven days from the laying, a section of arch, 3 ft. 10 in. wide, was separated out for testing, by cutting it through from beam to beam. But even then the concrete was green; for the cinders, as usual, had the effect of delaying the setting. After a cushion of sand and planks had been placed upon the separated portion of the arch, it was loaded up with dead-weight until there was 1239 lbs. per square foot on it. The deflection of the crown of the arch under this load was ¼ inch, which remained constant for the six days of the test, when it was considered that the floor had proved its strength, and the load was removed.

### The Strength of Foundations.

Mr. S. Anglin, Master of Engineering at the Royal University of Ireland, has had occasion to investigate the subject of the strength of foundations in a practical manner; a large mill under construction in Germany having failed. His attention was also drawn to the shutting up by the authorities of a town in Massachusetts of an extensive tenement house, because the foundations were too weak to bear the walls. Mr. Anglin classifies foundations in three general orders—rock, firm earth, and soft earth. A good ordinary rock foundation will bear anything up to 20 tons per square foot; while the solid mother rock sometimes met with in cuttings for reservoir and tank dams has practically no limit of strength. Under the head of firm earth may be included hard clay, clean dry gravel, and clean, sharp sand. It is desirable in England that the foundations should be carried at least 3 feet below the surface of the ground for sand and gravel, and 4 feet for clay, in order that they may not be weakened by the disintegrating effects of frost and wet. Different authorities vary much in their estimate of the load that this class of foundations will bear in safety. The German rule is 2½ tons per square foot. With good clay, well protected from the air and water, double this load can be safely provided for. The load on the London clay beneath the foundations of the Nelson Column in Trafalgar Square is not more than 1·3 tons to the square foot. Gravel and sand have borne 12 tons to the square foot. The former will not hurt if it is wet, because it does not run. Sand, on the contrary, must be kept from running by draining or piling. The tower of the Hamburg Water-Works is actually built on a quick-sand enclosed in a ring of sheet piling going below the level of saturation. Very soft ground must be piled. The City of Belfast has many examples of heavy buildings on the weakest of all possible foundations, rendered quite safe by artificial means.

### Evidence for the Econometer.

Mr. A. Bement writes to "Engineering" from Chicago to recommend the principle of checking the operation of industrial furnaces by sampling the waste gases for carbonic acid. He states that he has employed Arndt's econometer with complete success in all cases, and contends that a proper understanding of the indications of the instrument affords evidence of the due proportioning of the air entering the furnace. In certain experimental work, the object of which was to produce perfect combustion without excess of air, the fuel being bituminous coal, it was found possible to get the proportion of carbonic acid up to 19; but it fell to 7·3 in three minutes, owing to the coal being supplied to the fire in such quantity that the oxygen of the air was insufficient to burn up all the hydrocarbons given off. After several attempts, the right way of stoking was hit upon, and the proportion of carbonic acid remained constant at 19. In cases of ordinary boiler firing, the effect of varying thickness of the fire is immediately indicated by the instrument; and it is found that about 10 per cent. of carbonic acid is about the maximum for this kind of work, with the furnace employed. Taking all his experiences together, Mr. Bement concludes that the determination of carbonic acid alone affords a most convenient and positive guide for the avoidance of carbonic oxide, as well as excess of air. He therefore contends that the determination of carbonic acid only, by the continuous indications of the gravimetric instrument, is of more value as a guide for working furnaces at the highest efficiency than any form of chemical analysis. He uses it, indeed, in preference to chemical analysis, even when the latter is going on for other purposes at the time. This, of course, does not apply to the ascertainment of the heat-balance, for which the best obtainable analytical work is not complete or comprehensive enough, except for the attainment of merely approximate results.

**Institution of Gas Engineers.**—The annual general meeting of the Institution will be held on the 3rd prox.; but, as usual, only the formal business, consisting of the reception of the report of the Scrutineers and the election of President, Vice-President, members of Council (to replace those retiring), and Auditors, will be transacted. The meeting will then be adjourned till May 1, when the members will assemble at the Institution of Civil Engineers to deal with technical questions.

**The Dividend of the Gaslight and Coke Company.**—We learn from the Secretary and General Manager of the Gaslight and Coke Company, Mr. John W. Field, that the accounts for the half year ending Dec. 31, 1899, show that (subject to audit) the balance to the credit of the net revenue account will enable the Directors to recommend the payment of a dividend at the statutory rate of £4 18s. per cent. per annum, carrying forward a balance of £193,333 8s. 4d. This time last year the balance to the good was £53,759; while in August it was £139,557 19s.

# TECHNICAL RECORD.

## A DE BROUWER COKE-CONVEYOR AND A CARBURETTED WATER-GAS PLANT AT THE CRYSTAL PALACE GAS-WORKS.

The Crystal Palace District Gas Company supply an extensive area, containing a residential population. The needs of that population, the natural depreciation to which plant must yield with time and service, the circumstances of the labour market, and the necessity of meeting expanding business with a minimum increase in manual labour, have all combined to render inevitable a large scheme of extension and improvement. It was to this work that Mr. Sydney Y. Shoubridge found it necessary to devote himself soon after his installation as Engineer of the Company; and now section by section it is being, and will be, taken in hand as occasion admits and necessitates. The preparatory plans perfected, the early part of last year witnessed the signing of the first contracts. To-day the works comprised in those contracts are practically completed—somewhat behind the stipulated time, it is true, but the fault (oft-heard in many places during the past year) rests with the state of the iron and steel trade, and is not actually attributable to any remissness on the part of the contractors. The works which are now almost out of the hands of the latter consist of a complete carburetted water-gas plant and a De Brouwer coke conveyor and elevator; and it is with these, and not prospective work, that the present article will deal.

### The De Brouwer Coke-Conveying Plant.

While from the point of view of magnitude and of capability as a gas producer the carburetted water-gas plant is of foremost importance to the Company, the De Brouwer coke-conveying plant—this being its first adoption in this country—possesses an interest for English gas engineers which, for the moment, overshadows the claims to attention of the more imposing water-gas apparatus. Therefore, upon the coke-conveyor we will first pen the information at command. It would not be news to readers of the "Journal" to be told that the merits of this conveyor have obtained for it an extensive use on the Continent; but it may be interesting to many to learn that it was the opportunity which was afforded Mr. Shoubridge of witnessing the operation of the plant at the Hague Gas-Works, at the time of the visit of the Institution of Gas Engineers, that induced him to advise his Directors to adopt the De Brouwer system in preference to home-invented competitors. This is a tribute to the value to English gas engineers of opportunities for investigating the work and practice of their Continental brethren. Although Messrs. Jenkins and Co., Limited, of Retford, have now been "sole makers" of this form of conveyor for a considerable time, this is the only example of the plant that has so far been erected in this country; and, had the members of the Institution not seen it at work on the Continent, it might possibly have been some time longer before the system obtained a footing in this country—gas engineers, like other human beings, having an inclination for a little ocular demonstration of the value of a thing before they invest their money in it. But now that the De Brouwer apparatus has established itself here, doubtless more will soon be heard of it—in fact, we know that several engineers of important gas-works who are contemplating laying down coke-conveying apparatus are delaying their plans pending the opportunity of being able to personally observe the performance of the Crystal Palace plant.

It is not many years ago that we heard it said that a really good coke-conveyor, which should be a help and not a hindrance on a gas-works, was a desideratum. Of late there has been quite a spurt in the equipment of retort-houses with plant for automatically removing the coke; and there are at the present time, in actual operation in gas-works, several examples of different makes of coke-conveyors, between which it is now merely a question of the "survival of the fittest." In the De Brouwer conveyor, Mr. Shoubridge thoroughly believes that he has secured a very valuable help in facilitating the work of the retort-house, and in lightening its cost. Among other points which struck him when he saw the plant in operation at the Hague works were its simplicity, and the almost entire absence of friction and rattle. The latter was rather a conspicuous and irritating feature of some of the older forms of pan conveyors, which were blessed with so many parts and so much weight that they gave endless trouble in working, and no little expense was involved in the constant replacement of worn-out portions. In this respect, the De Brouwer conveyor stands out in marked contrast; and it is Mr. Shoubridge's impression that it is destined to succeed on this very score—that there is, so far as he has been able to judge, so little wear and tear about it. Without pursuing the general subject further, we will at once proceed to describe the plant laid down at the Crystal Palace works.

The conveyor has been constructed for dealing with the coke from No. 4 retort-house. This house occupies a position in the works where the works railways narrow towards the main junction com nunicating with the South-Eastern Railway. A double line of railway passes close to one end of the house, and a single line close to the other end. On both sides of the house, there are large coal-storing spaces, and several buildings containing boilers and other machinery. The coke yard at the end where the double line is, is limited in extent by other branches of the railway passing to other portions of the works, and the space at the opposite end is only narrow on account of the boundary. The retort-house floor is at the same level as the coke yard; but there is a basement below, in which the furnaces and regenerators are built. The stoking is done by means of West's compressed-air machinery; and the coke has, until recently, been wheeled out to one end of the house, which is fitted with eighteen beds of eight through retorts, 20 feet long.

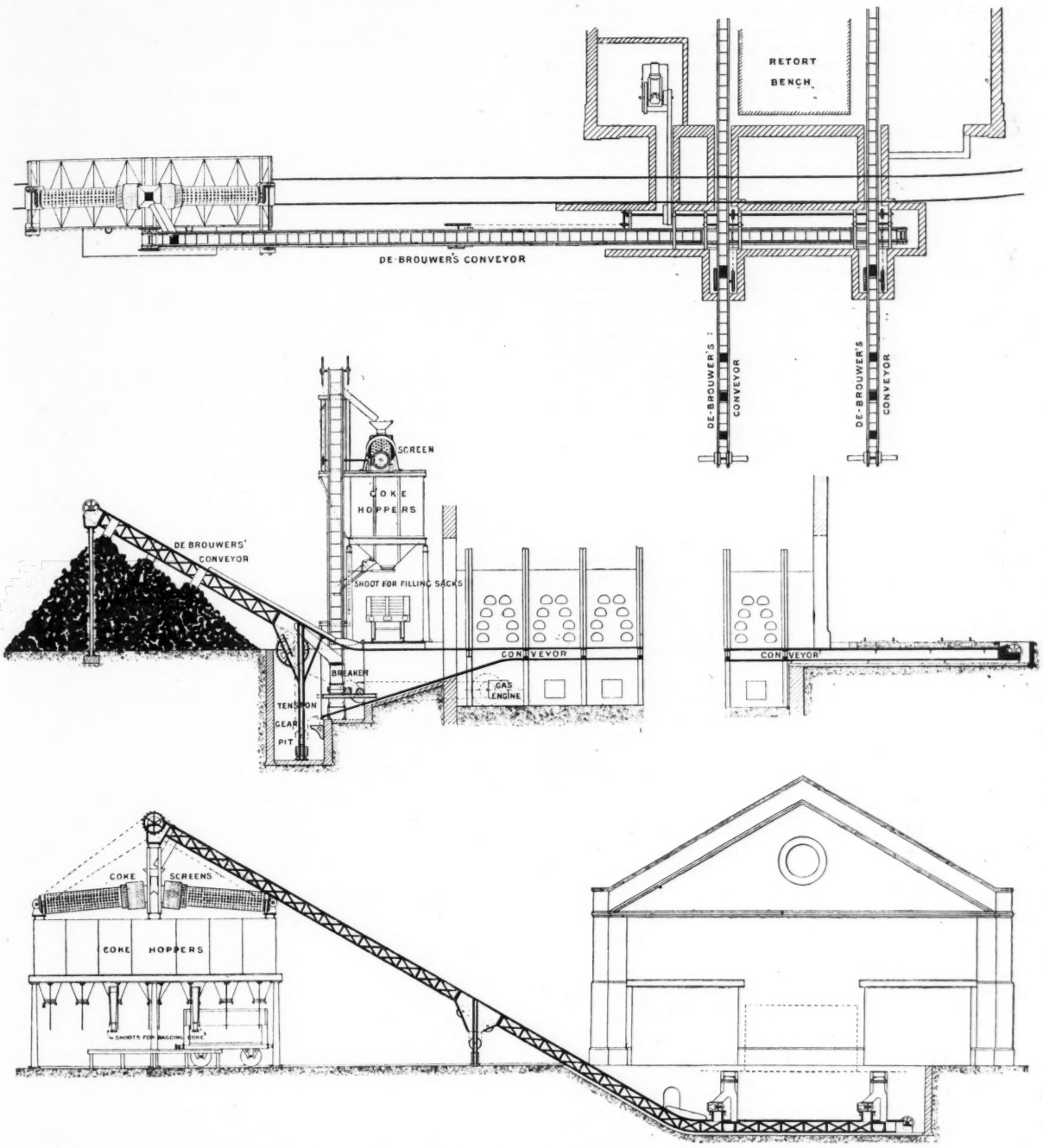
The drawings on p. 203 show the plant in side and end elevation and plan. The plant is designed to take the coke from each side of the retort-bench, and quench it thoroughly at the end of the retort-house outside. The coke from each conveyor, after having all the quenching water drained out of it on the sloping end of the conveyors, falls into a return shoot, which delivers it either to a coke-breaker or direct to the horizontal part of the inclined cross conveyor, which then conveys the coke to the screens for separating the breeze and dust. Underneath the screen is placed a large storage hopper, capable of taking twenty-four hours make of coke, and divided into eight compartments, of which one holds breeze dust, another clean breeze, four others screened broken coke, and the other two large coke. By an arrangement of slides in the screens, six of the compartments can be filled with unbroken coke separated from breeze and dust. The storage hopper is supported on columns spanning the railway; and each compartment has a door at the bottom with levers, by moving which the coke can be loaded into railway waggons or carts placed underneath. The doors are of considerable size, but can be moved with the greatest ease, as they run on a simple arrangement of rollers. At one side of the supporting columns, there is a platform raised above the ground to the level of the bed of the coke carts or vans; and by means of side shoots from the conical bottoms of two of the compartments of the hopper, the coke is filled into bags, which are then taken on sack trucks, and placed in the coke-vans backed up to the platform for the purpose. The bagging shoots have an arrangement at the outlet end for holding the bags open, and clips for keeping them in position. The clips act automatically, so that the bag, when slipped under them, is held fast and gripped tighter as the load increases. A platform weighing-machine is placed under each bagging shoot at the level of the platform, so that the bags can be weighed and accurately filled with the required quantity of coke.

The long sloping ends of the two retort-house conveyors are for two purposes. Firstly, they provide a means of continuing the use of the retort-house conveyor when the storage hopper happens to be full. This may easily occur from want of railway waggons, from a block on the railway, or on Sundays and holidays. Secondly, they are fitted with slides, by opening which coke can be stored over the whole space at the end of the retort-house to a depth of 20 feet.

In this installation, therefore, the coke, amounting to 80 tons per day, can be drawn from the retorts, dropped into the conveyor, carried to the outside of the retort-house, get thoroughly quenched there, pass into the coke-breaker if broken coke is wanted, or pass direct to the cross conveyor, be elevated to the top of the screens, go through the screens where the coke and breeze and dust are separated, be stored in overhead hoppers, and be loaded into carts or railway waggons, without any hand labour at all, except the opening of the doors in the hopper to let the coke fall out into the waggon.

The conveyors in the retort-house consist of two troughs—one on each side of the bench—built up of steel plates and angles. The troughs are a little over 2 feet wide, and are let in level with the floor-plates. The troughs are continuous from end to end of the house, under the railways outside, and up the sloping ends to the top; the horizontal portion being joined to the slope by a curved piece, of which the radius is considerable and the curve very easy. In this trough a transmitting chain is laid. The chain is formed of two lines of links kept apart by means of round iron stay-bars at intervals, so that each line of links runs close to the sides of the trough, where there is placed a line of angle-steel to form renewable pieces to take the wear. The chain rather resembles a rope ladder than anything else we can think of at the moment. It is continuous throughout the length of trough up to the top of the slope, where it passes over two pulleys or rollers keyed to a shaft running in bearings. The chain then returns inside the lower member of the latticed structure, and then engages with the two sprocket wheels of the driving mechanism. It next takes a course round a weighted tension roller, and up a sloping angle steel roadway to the underside of the girders supporting the retort-house floor. The angle roadway is bolted to these girders, and takes up a space of 4 inches below them, extending from end to end of the retort-house. The chain then passes round another pair of rollers, and so back into the trough in the retort-house floor. Water is run into the trough at the end of the retort-house, from a plain pipe, so that the water follows the coke as it is moved along by the chain. At the commencement of the sloping end, there is fixed another water-pipe for the purpose of making good the rapid evaporation which takes place from the quenching of the coke. As soon as a "draw" is completed, the water is allowed to run into the trough until it is filled to a depth of ¼ or ½ an inch, when both taps are closed. Immediately before the commencement of the next "draw," the driving apparatus is started, and the chain travels very slowly towards the sloping

## THE DE BROUWER COKE CONVEYING AND ELEVATING PLANT AT THE CRYSTAL PALACE GAS-WORKS.




end, and returns underneath the floor. The coke is then drawn out of the retorts, and falls directly into the trough, the whole width of which is clear, except for about 1½ inches at each side, where the chain runs. Owing to the forward motion of the chain, one of the stay-bars comes against the heap of coke, and sets it in motion; and it continues to move forward by sliding gently along without showing any tendency to turn over, or move at all except bodily. No doubt the small amount of water in the trough serves to lubricate the way, as well as to keep the trough and chain quite cool. The moving heap of coke pushes the water in the whole length of the trough before it, and so fills the portion at the foot of the slope to a considerable depth; and the sides are considerably deeper there to allow for this. As soon as the coke (which is still red hot in the mass, though quite quenched at the bottom for an inch or two) arrives at the foot of the slope, the water is pushed still further up the slope until the action of gravity overcomes the resistance to backward flow through the mass of the coke; and then the water falls back over the top of it, and through its mass, quickly quenching it thoroughly—the rapid and somewhat turbulent evaporation of the water causing the operation to be more complete. While the quenching is going on, the coke is being moved forward up the slope; and as soon as it gets above the surface of the water, the surplus moisture immediately drains out of it, and runs back down the slope, while the heat still left in the coke evaporates a further portion, and makes it practically dry a few feet above the foot of the slope. There is no waste of water out of the trough, except that lost by evaporation in quenching; and none overflows into any other portion of the apparatus.

The operation of the conveyor and the quenching of the coke have been described somewhat minutely, because of the exceedingly simple means employed to attain a thoroughly satisfactory result. There is nothing more complicated than a couple of plug cocks and two pieces of plain pipe used in the whole operation of quenching—no sprays, nor roses, nor any other delicate parts. Indeed, the prominent feature of the whole of the mechanism is its simplicity. For instance, an inspection of the conveyor at rest would lead nine out of every ten competent men to say that such a plant would be more likely to smash the coke than to move it, especially at the inclined end; yet the fact is that the coke is pushed along in a manner which can only be described as practically perfect.

Great credit is due to M. De Brouwer for the three chief features of his patent: First, the idea of placing a remarkably simple and light transmitting apparatus in a trough in such a way as to cause the larger lumps of coke to push the breeze and small pieces forward. Second, the supply of water to the trough to keep the parts cool, and the use of the water at the

delivery end of the plant to quench the coke thoroughly, together with the inclined end for draining and drying the coke, to prevent its being saturated and waterlogged. Third, the sloping end continuous with the horizontal portion to act as an elevator, and save all the endless trouble, wear and tear of machinery, and crushing of coke which arises from the dropping of the coke from a conveyor to an elevator. Then the absence of anything but the merest puff of steam inside the retort-house must add comfort to the workmen, and tend to increase their healthiness; the enormous volumes of steam generated at the quenching place outside indicate conclusively the relief of the atmosphere of the retort-house.

The apparatus at the Crystal Palace works is driven by means of a 14-horse power Tangye gas-engine placed in a room under the floor of the retort-house, and driving a line of shafting outside the walls of the house under the railway. There are separate friction clutches for starting or stopping either of the three conveyors, and claw clutches for controlling the coal-breakers; the levers for working the clutches being all brought to convenient stands above ground.

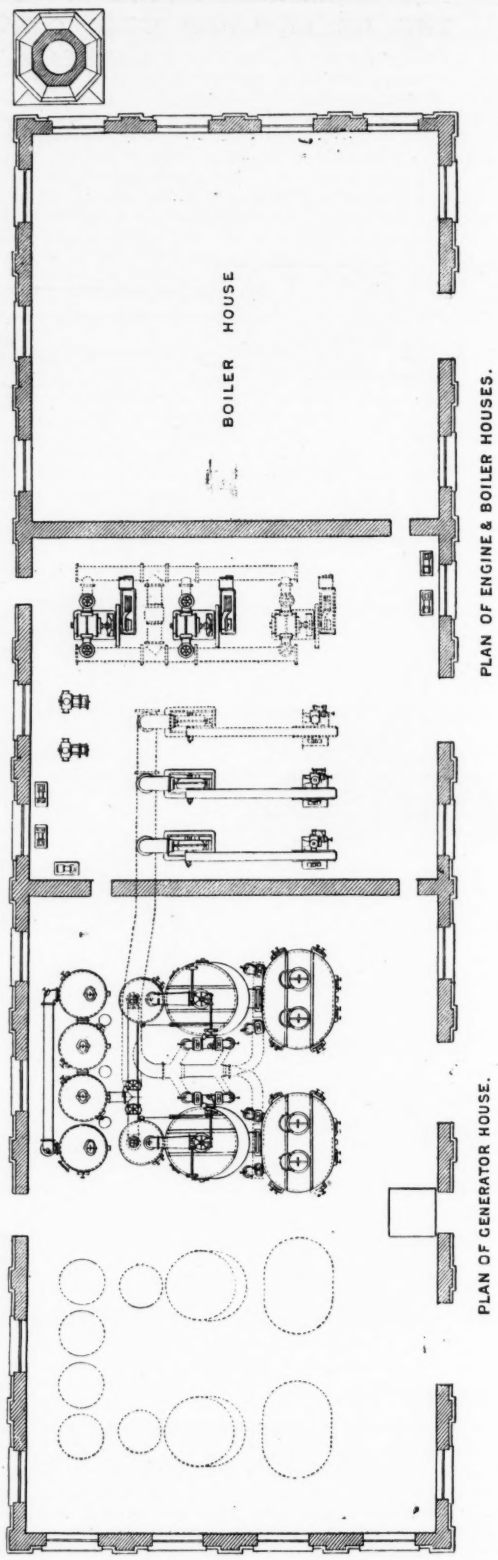
A fact illustrative of the vast difference between gas-works engineering on the Continent and that in England has come to our knowledge during a visit to this plant. Nearly every English engineer who had seen the conveyors at work in Belgium came over with the thought that success on the Continent did not mean certain success here, because the retort-houses there are mostly short, and the apparatus is therefore made light. Considerable criticism was spent on the chains forming the transmitting part. The ever-present subject of wear and tear of the structure also seemed to weigh heavily in the minds of English engineers. The troughs on the Continent are made of two side angle-irons riveted to a bottom plate, on which the coke moves. The destruction of this plate in the course of years means to English engineers the practical renewal of the whole plant. It was only after much disappointment in getting the conveyor adopted that Mr. Jenkins hit upon the very simple, and consequently efficient plan of making the wearing portion of the troughs easily renewable, and quite distinct from the permanent structure. This is done by placing in the trough a plate forming a false bottom. The difficulty of the strength of the chain was met by making the links proportionately stronger, and all of forged steel instead of castings; all holes being bored and pins turned exactly to gauge.

Mr. Shoubridge and his Directors deserve the thanks of the Gas Industry for having the courage to adopt the first of these conveyors on this side of the Channel; and we trust they will find the machinery as successful in their case as it seems to have been in a large number of places on the Continent. We would also bear testimony to the thought and practical skill which Messrs. Jenkins and Co. have spent on the design and construction of the apparatus.

### The Carburetted Water-Gas Plant.

We now come to the carburetted water-gas plant, which, although it is given second place here, is really of superior importance to the Company in that it forms a powerful addition to their productive capabilities. The principal portion of the plant is housed in a building which, while it does not possess any particularly striking structural features, is interesting from the fact that the whole of the bricks and even the artificial stone copings and finials (composed of fine granite chippings and portland cement) were made on the works by the Company's own men, who also did the constructive work. In passing, it may interest readers to learn that the works are situated on a bed of clay some 60 to 70 feet in depth; and in order to utilize this, to give employment to their men during the slack season, and to profitably dispose of the spoil from excavations, the Company have put down a complete brick-making plant, with the result that last year something like 2 million bricks were produced. Returning to the subject in hand, the disposition of the buildings and water-gas plant will be seen on the accompanying plan. The generator-room is 93 ft. by 58 ft. 3 in. by 40 feet, inside measurements. It has an iron and slate roof; and is exceedingly well lighted. Adjoining is the engine-room, the dimensions of which are 50 ft. by 58 ft. by 20 ft.; and next to it is the boiler-room, which is 56 ft. by 58 ft., and the same height as the engine-room. These buildings and the machinery have all been designed for four sets of plant, equal to a daily production of 5 million cubic feet of carburetted water gas. At present only half the space is occupied with two sets of plant, capable of producing together 2½ million cubic feet a day.

The plant, which has been constructed under the Merrifield-Westcott-Pearson patents, was supplied and erected by the Economical Gas Apparatus Construction Company, Limited. It has only been at work a few weeks, and during that time not fully; so that there has not been an opportunity of thoroughly testing its performance. But so far as Mr. Shoubridge has been able to judge, the work has been carried out very satisfactorily; and the plant has, in actual work, considerably exceeded its nominal output. This promises well for the satisfactory fulfilment of the contractors' guarantee, which is to the effect that the plant shall give an efficiency equal, if not superior, to that of any yet erected. The generators are oval in shape, built of tank steel, with the usual double fire-brick linings, and asbestos non-conducting material between the fire-brick and the shells. They have hopper bottoms for removing




THE CARBURETTED WATER-GAS PLANT AT THE CRYSTAL PALACE GAS-WORKS.

the ashes, also stoking-holes for removing the clinkers from the grate-bars, and two coaling-holes on each generator for the equal distribution of the fuel. The superheaters and fixing chambers are in one shell; the superheaters being oval, and the section of the fixing-chambers circular—the total height being 38 feet. These also have the usual substantial fire-brick lining and asbestos non-conducting material between the fire-brick and the shell. They are divided into two compartments by fire-brick arches, supported from the foundations, so that no strain can come upon the shells; the superheaters and fixing-chambers being filled with checker bricks. Each compartment is provided with an air-blast connection, which enables the operators to control the heats, and keep them at the proper temperature in each chamber. The carburetting chamber is an open space between the other two.

The generators and superheaters are connected together with water-cooled valves and short connections. The valves are so

arranged and connected up with hand wheels, racks, and pinions that, by opening one, it closes the other; at the same time reversing the steam to the generator—gas then being made up or down in the generator according to the position of the water-cooled valves. The water gas leaves the generator either at the bottom or top, passing to a flue in the superheater common to both openings. It then travels down the flue to the bottom of the superheater, and up through a mass of hot checker brick, where it is superheated to about 1500° or 1600° Fahr. At the base of the fixing-chamber, or just below it, the water gas comes into contact with a finely divided stream of oil sprayed into the chamber by an improved oil-injector, arranged at equal distances around the shell. The injector sprays the oil, in the form of a batswing gas-flame, in a thin wide sheet; and the hot water gas vaporizes it, and mixes with the oil vapours, carrying them through the beehive arch and the hot checker bricks of the fixing-chamber, where the oil is fixed, and converted into permanent gas. It then passes off through the gas-outlet and take-off pipe to the washer; thence through the oil-heater to the scrubbers, condensers, and relief holder. There are two scrubbers and two condensers so arranged that the gas passes through both scrubbers and both condensers. The oil is heated before entering the vaporizing-chamber by the hot gas on its way from the washers to the scrubbers; the oil-heater being placed between the wash-box and the scrubbers, and the gas giving up part of its heat to the oil. It is claimed that, by this mode of heating the oil, better results and a more uniform temperature are obtained, as the oil-heater coils do not become clogged up with lampblack and pitch—thus saving considerable time and annoyance in cleaning.

Reverting to the generator, another advantage claimed is that, with a greater area of grate bar and a shallow fire bed, an increased make of gas from a given amount of fuel is obtained; or, in other words, less fuel per 1000 cubic feet of gas produced is required. This is accomplished by blowing the generators so as to produce just sufficient carbonic oxide to keep the superheater and fixing-chamber at the proper temperature to fix the oil and burn the excess carbonic oxide to carbonic acid in the generator, and storing the heat in the fuel to decompose the steam, allowing no carbonic oxide to escape to smoke-stack.

There are several other improvements in the plant, such as the valves in the wash-boxes, which are so connected up that, when the stack-valve is open, the valve in the wash-box is closed over the end of the dip-pipe, preventing any escape of gas to the fixing-chamber. When the stack-valve is open from loss of seal in the washers, or other causes familiar to gas makers, with this arrangement the water can be entirely drawn out of the wash-boxes, and the valve opened without any danger of an explosion, which is liable to take place by the gas igniting in the take-off pipe.

Coming next to the engine-room (the dimensions of which have already been stated), we think we may say, without fear of contradiction, that it is one of the brightest engine-rooms in connection with water-gas plant in the kingdom. The walls are built of glazed bricks, with ornamental dado and frieze. The floor is tiled; and the roof is lined with stained boards. The room is well lighted with side windows; and near its apex a portion of the roof is also glazed. The machinery comprises two Sturtevant gas blowers, strap-driven by two Tangye engines, of the high-speed inverted type (350 revolutions), made specially for this class of work. There are also two of Messrs. Waller and Co.'s four-blade exhausters and engines, each capable of dealing with 100,000 cubic feet of gas an hour, and used for pumping the gas out of the relief holder, and forcing it through the purifiers and meter into the storage holder. A number of other pumps for oil and water complete the equipment of the room. The machinery is all in duplicate—one set being sufficient for working the water-gas plant so far erected; the other set being kept in reserve.

In the adjoining boiler-house, there are two boilers, 30 feet long by 8 feet diameter, fired with breeze and tar made in the water-gas plant. They are fitted with a forced-draught arrangement; but this is hardly a necessity when firing with tar, because the house is provided with a good chimney, 120 feet in height. Under the conditions prevailing here, that very difficult operation of burning tar without smoke is accomplished. By means of two small valves, the steam and tar sprays are under complete control.

A unique and most important feature in promoting the efficiency of this water-gas plant is the method of re-circulating the water, and dealing with the tar. All the effluent liquor from the apparatus is run off into a specially designed tar-separator (placed underground), where the tar automatically works its way into one compartment, from which it runs out of its own accord into a tar settling-tank. From here it is pumped to the feed-tank in the boiler-room for use as fuel, or, preferably, taken to the tar-well for sale. The effluent water from the separator runs into the water-tank, from whence it is pumped and re-circulated over and over again through the washers and scrubbers—thus in a short time becoming saturated with the different components of the gas. The condenser water is re-circulated and made use of; so that the only water which has to be provided after the plant has once been started is that required for the boilers.

Within a convenient distance of the generator-house is the oil-storage tank, 60 feet diameter by 25 feet deep, and capable of holding 442,000 gallons. The oil is sent to the works in tank-waggons, and pumped from them into the storage tank, from which it is pumped to the carburetting chambers as may be needed from time to time.

The gas passes from the condensers and scrubbers to an existing holder, which is used as a relief holder, and from there it is exhausted and forced through a set of new purifiers. The house in which these are located is a skeleton structure, made of steel stanchions and girders, built in three stages—the purifiers being on the second stage, with a revivifying-floor above. The latter is constructed of breeze concrete, strengthened by pieces of old gas-tubing, somewhat on the principle of the Monnier system. The contractors for the ironwork and purifiers were Messrs. C. & W. Walker, of Donnington. The purifiers, five in number, are each 40 ft. by 22 ft. by 4 ft. 9 in. without lutes; each vessel having two lids, with india-rubber joints, similar to the plan adopted by Mr. Henry Green, at Preston. Two light travelling cranes have been provided for lifting the lids. In emptying the purifiers, the material in the case of oxide falls through openings in the bottom of the boxes, into trucks on rails beneath, which convey it to a hoist at one side of the structure, which raises it to the revivifying-floor above. When revivified, the material is returned to the purifiers from the upper floor by means of shoots. Three of the purifiers are charged with lime and two with oxide. The connections throughout are 24-inch; and the purifiers are all controlled by means of Weck centre-valves. Close to the purifier-house is the meter for the carburetted water gas. It is built on Mr. Livesey's brick-tank principle, was supplied by the Gas Meter Company, and has a capacity of 100,000 cubic feet per hour. Adjacent to this, a photometer-house is being erected.

### Projected Inclined Retort Installations.

This ends our notice of the completed extensions and improvements, and now just a few words in conclusion as to the next steps to be taken in the remodelling of the works. At the present time, one of the old retort-houses, the settings in which were quite worn out, has been razed to the ground, and a new building is to be erected and furnished with inclined retort plant similar to that Mr. Shoubridge put in at Salford. It is hoped the house will be finished in time to assist in meeting the demands of next winter. Eventually, if Mr. Shoubridge's intentions are consummated, the whole of the horizontal retort-settings on the works now worked by hand will, as they reach the end of their profitable working life, be converted to the inclined retort system. Sufficient has been said to show that the Crystal Palace Gas-Works will, in the near future, contain one of the best equipments on modern lines of any similar establishment near London.

## THE EVERETT COKE-OVEN GAS PLANT.

### The Installation at Boston, U.S.A.

In "Progressive Age" for the 1st. inst., there appeared an article by Dr. F. Schniewind, of the United Coke and Gas Company, on the composition of the gas produced by the above-named plant, which is now being supplied to two gas-works in Boston (U.S.A.). It may be remembered that a description of the plant, prepared from articles contributed by Dr. Schniewind to our American contemporary, was given in the last volume of the "Journal" (pp. 1114, 1176); but when he wrote them no data were available in regard to the composition or physical properties of the gas. As it is at present in regular use in Boston, he has been able to obtain them, and place them on record. The sample tested was taken at the Allston works of the Brookline Gas Company, and was examined by Dr. J. F. Wing, Chemist of the Boston Gas Company, in the presence of several prominent gas men. The illuminating power was found to be 21·1 candles; the composition of the gas being as follows:—

| | Per Cent. |
|---|---|
| Illuminants ($C_mH_n$) | 6·6 |
| Marsh gas | 40·3 |
| Hydrogen | 37·2 |
| Carbonic oxide | 7·3 |
| Carbonic acid | 0·4 |
| Oxygen | .. |
| Nitrogen | 8·1 |
| Total | 99·9 |

The gas was part of the first ten hours' production, and had been treated only by the condensing plant, and purified by oxide of iron and lime. It had not been enriched. The organic sulphur, according to determinations made by the State Gas Inspector, amounted to less than 8 grains per 100 cubic feet, whereas the law allows 20 grains. The purified gas was free from sulphuretted hydrogen.

Dr. Schniewind thought it would be of interest to compare the Everett gas with other illuminating gases; and he selected for the purpose carburetted water gas of average candle power, ordinary London coal gas (average of three companies), gas usually supplied in the United States (average of ten cities), and

coke-oven gas of the New England Gas and Coke Company. The following are the figures:—

| | Carburetted Water-Gas. | London Coal-Gas. | American Coal-Gas. | Everett Coal-Oven Gas. |
|---|---|---|---|---|
| Illuminants ($C_mH_n$) | 12·82 | 3·43 | 6·19 | 6·6 |
| Marsh gas | 18·88 | 33·88 | 37·41 | 40·3 |
| Hydrogen | 37·20 | 52·85 | 46·38 | 37·2 |
| Carbonic oxide | 28·26 | 5·34 | 5·53 | 7·3 |
| Carbonic acid | 0·14 | 0·65 | 0·52 | 0·4 |
| Oxygen | 0·06 | 0·23 | 0·25 | .. |
| Nitrogen | 2 64 | 3·94 | 3·72 | 8·1 |
| | 100·00 | 100·32 | 100·00 | 99·9 |
| Candle power | 22 0 | 16·4 | 16·17 | 22·1 |
| Calorific value (B.T.U.) | 749·9 | 648·8 | 734·00 | 749·7 |
| Specific gravity | 0·582 | 0·376 | 0·429 | 0·5 |

Dr. Schniewind says that it is evident from this table that the coke-oven gas as now produced at Everett is even superior to standard coal gas. It is only natural, therefore, that everybody connected with the enterprise feels elated over the results. It should be understood, however, that it is not expected to maintain such a high candle power as at present, for reasons to be explained later on, in connection with the quantity of gas produced. At present, the coking time of the ovens is about 32 hours. This will be materially reduced. The surplus gas is only taken during the first ten hours, and amounts to 2900 cubic feet per gross ton of coal. At this rate the plant is not yet operating under the best heat economy, which could hardly be expected after so short a period of operating the gas department. The illuminating value of the gas is constantly decreasing with the progress of the coking operation. Any increase in the volume of the surplus must therefore necessarily add gas of a lower candle power, whereby the average will be somewhat reduced. How much this will be, the near future will tell; but it is expected that the illuminating power, even of the maximum surplus, will not fall below 17 to 18 candles. At the time the article was written, there were 200 of the entire 400 ovens in operation. The remaining 200 were to be started within four to six weeks. After starting the first batteries, it was found that certain red brick in the foundations of the ovens was of such poor quality that it had to be replaced by fire-brick. This delayed the starting of the plant to its full capacity. Considering the novelty of the enterprise, the fact that, beyond this unimportant change, no serious trouble of any nature has been encountered, but that, on the contrary, the starting of the colossal plant in all its departments took place without any hitch, speaks creditably for all parties connected with its design and management. The tar has proved to be of excellent quality; there is no difficulty in keeping the sulphate of ammonia above the usual standard of 25 per cent. ammonia; and the coke for all purposes has met with remarkable success. The bulk of the production is now used under the locomotives of the Boston and Maine and Boston and Albany Railroads. The President of the former Railway Company (Mr. L. Tuttle) has expressed the opinion that it is a perfect locomotive fuel. Dr. Schniewind states that experience has confirmed this good testimony. It has, he says, proved entirely satisfactory to the Railway Companies, and more so to their patrons. The results of using the coke under stationary boilers are shown by the following test, extending over 36 hours, made by a large consumer:—

| | |
|---|---|
| Coke used | 7,743 lbs. |
| Water actually evaporated | 86,720 ,, |
| Equivalent water evaporated from 212° Fahr. | 90,016 ,, |
| Water evaporated per pound of coke used | 11·275 ,, |
| Equivalent water evaporated per pound of coke used from 212° Fahr. | 11·705 ,, |
| Salt water pumped | 2,312,442 gals. |
| Salt water pumped per pound of coke used | 299·5 ,, |
| Average temperature of feed water | 206·5 degs. |
| Average temperature of heat in the flue | 437·5 ,, |
| Draught in the flue | 0·25 in. |
| Average steam pressure | 113·5 lbs. |
| Average water pressure | 65·0 ,, |
| Coke used per sq. foot of grate surface | 78·54 ,, |
| Percentage of refuse in coke | 7·08 ,, |

Furthermore, the coke is stated to be successfully used by foundries. Large export shipments have been made to Mexico and Canada, where it is used, instead of Connellsville coke, by copper, nickel, and silver smelters. A large crushing plant is also in operation for the manufacture of crushed and screened coke of various sizes. For all these purposes the demand for coke is constantly increasing, and orders have been booked ahead for the larger part of the product of the current year. This proves conclusively that the demand for smokeless fuel exists, and also that the Otto-Hoffmann coke meets it. The New England Gas and Coke Company find themselves, after a few months' operation, in the enviable position to refuse the acceptance of coke orders on account of their inability to fill them. Dr. Schniewind thinks it may be predicted, without running the risk of being over-sanguine, that the Otto-Hoffmann process is destined to play an important part in the solution of the great problem of supplying in large cities light, heat, and power from one central station.

# REGISTER OF PATENTS.

**Automatically Operating a Valve at any Predetermined Time.**—Stenhouse, A., and Whitehead, E. A., of Broken Hill, New South Wales. No. 26,792; Dec. 19, 1898.

This invention has for its object to provide apparatus for operating a valve whereby (say) the supply of gas flowing through a pipe may be turned on or started automatically at any predetermined time. It consists essentially in the employment of a valve in the supply-pipe, arranged in such a manner that it tends to close or open (as the case may be) on the application or release of tension of a cord connected directly to, or indirectly with, it and with the drum of an alarum mechanism of a clock; intermediate mechanism being in some cases employed between the drum and the valve. The apparatus may be used (for instance) for operating incandescent burners having pilot-lights, and with the object of making the lighting and turning out of street-lamps automatic. In this case, the patentees remark, it is not only necessary to be able to turn out the light at any time determined upon, but also to turn it up again at any predetermined time. To enable this to be done, they have designed an "alarum" mechanism of which the timing portions are in duplicate—one to control the turning on of the valve, and the other its turning off.

The ordinary valve or cock has a two-arm lever, and attached to each arm is a chain or cord. To one of the cords is secured a heavy weight; and to the other is attached a cord-gripper, to be described later. The weight must be sufficiently heavy to overcome the friction of the valve and the weight of the cord-gripper. The clock employed has an ordinary dial and two indicator dials, on which are marked the times of opening and closing the valve—their faces showing 24 hours. An endless cord passes round, and is driven by, the alarum drum of the clock, and runs through the cord-gripper and over guide-pulleys set in suitable positions. One of the pulleys has its spindle set in a slot, and is provided with a thumb-screw, by means of which it may be moved in the slot so as to put tension on the endless cord. A fixed plate is provided with pins, one at each end, and is set in such position as to actuate the cord-gripper at the top and bottom of its stroke.

The cord-gripper consists of a plate having guide-holes through which the cord passes, and eccentrics between, bearing against the cord. The eccentrics are set on pins fixed in the plate, and have levers attached, which are connected at their free ends with toggle-links meeting at the centre of the plate upon a pin. A flat spring is fixed at one end to the pin on the plate; and at its other end it presses upon the pin connecting a lever with a toggle-link so as to continually exert a force upon the levers towards the cord, and so cause the eccentrics to grip the cord.

The action of the apparatus (which is described in the specification in connection with a series of detail drawings—23 in all) is as follows: At the time for which the apparatus is set to turn on the valve, the "alarum" mechanism for the purpose is set in motion by the clock, and winds up the endless cord, which, being automatically gripped by the cord-gripper, pulls on the valve-lever cord. This action, however, is only permitted to continue through a sufficient distance to open the valve; and then the mechanism ceases to work. When the time arrives at which the valve is to be closed, the "alarum" mechanism for the purpose is set in motion by the clock; and the endless cord is again wound up until the toggle of the gripper strikes the bottom pin on the fixed plate—so releasing the cams, and freeing the gripper from the endless cord. The weighted valve-lever then overcomes the friction of the valve and the weight of the gripper, and pulls the gripper up until the toggle has been thrown over to its original position, by striking the top pin of the fixed plate. By that time, the valve is closed, and the gripper is ready to operate for the next opening of the valve. This cycle of operations goes on automatically day after day, for as many days as the clock is made to go without rewinding.

**Coin-Freed Gas-Meters.**—Beechey, C. G., and Wright, A. T., of Liverpool. No. 27,123; Dec. 23, 1898.

According to this invention, the meter-mechanism is so arranged and adapted that it can be operated, and the meter set to supply gas, by the introduction of either pennies or halfpence, or coins having different sizes and values.

The carrier (as shown in the engraving, p. 207) is in the form of a small cylinder, with a transverse slot or chamber parallel with—and, say, through—the axis, into which slot coins fall when passed into the meter. The coin rests, when introduced, on a suitable support; and when the carrier is rotated, it is forced inwards or displaced in the slot of the carrier by an inclined bar, so disposed in relation to the carrier that, as it revolves, the back edge of the coin will bear on the displacer bar, and it will be forced forwards out of the slot on the opposite side. Hence, if there be any sticky matter on the coin, it will not stick in the slot. As the coin is pressed through the slot of the carrier, its projection on the opposite side increases; and at this edge it acts upon a tappet on a lever or arm (whose return action is effected by a weight or spring), and having a pawl or the like engaging with a toothed wheel, constituting the primary actuated or setting wheel of the mechanism. Connected with this toothed wheel—whose plane is vertical, and its axis parallel with that of the carrier—there is an inclined projecting device working in connection with a pin on the wheel, and by which the shaft is given longitudinal movement in either direction. And through it, by suitable levers or connections, the gas governing valve is opened when the apparatus is used after having been stopped by all the gas paid for having been consumed, and the slot closed when the full complement of coins which the mechanism is adapted to receive has been introduced. For instance, when the latter condition prevails, the spindle will be pulled or pressed outwards.

The teeth of the primary setting wheel, as well as the diameter of the coin-carrier and parts connected with it, are so proportioned that the amount of coin, in the case of a halfpenny, projecting from the carrier-slot will move the main setting wheel one tooth's distance, while the portion projecting in the case of a penny will move it twice this amount, or the distance of two teeth.

In front of the setting wheel, there is a dial and stationary pointer; the dial revolving with the wheel, and passing the pointer. The dial indicates

the number of pennyworth's of gas paid for and unconsumed which exist at any moment.

The spindle, which is operated by the travelling pin, and having the longitudinal movement referred to, is revolved by the meter in passing gas, through a train of toothed wheels, with price-change gear therein; the toothed wheel on the spindle being loose, but working the spindle by a carrier on the wheel, acting on the spindle, and so arranged as to allow

*Fig. 1.*

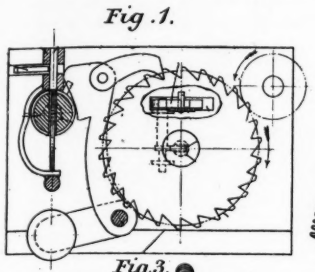


*Fig. 2.*

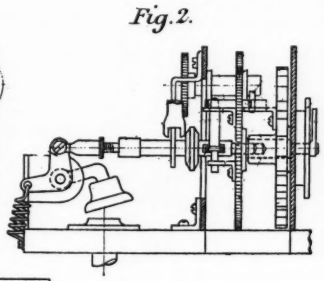


*Fig. 3.*

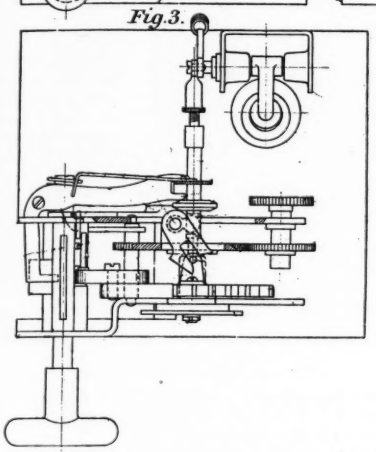
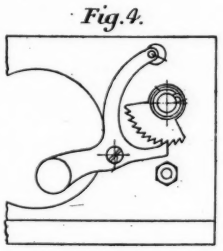


*Fig. 4.*



of this longitudinal movement. When all the gas paid for has been consumed, the pin working in connection with the primary setting wheel will cause the shaft to move longitudinally, and close the gas-valve.

The slot-closing lever, in one case, as well as a lever for operating the gas-valve, are moved by a small disc or wheel, which works through the forked ends of these levers. Then when the gas-valve is shut by its lever, the slot will be open; and the opening is effected by its lever when gas is used after the complement of coins has been introduced.

A ratchet wheel and pawl are provided on the coin-carrier to prevent the carrier being turned backwards. There is also furnished a projection in the path of the coin, which the coin would come up against so long as it is not discharged from the carrier; and it prevents a second actuation of the mechanism by the same coin. There is further provided, in connection with the pawl and primary setting tooth wheel, a pawl-locking device, consisting of a projection on the frame of the apparatus, under which the end of the pawl comes when at the outer end of its stroke. By this means, the pawl cannot be jerked out of contact with the wheel by any sudden movement, and so the wheel is locked at the end of the normal movement by its own pawl.

Another characteristic of the invention is the employment of a spring in connection with the primary setting wheel, actuated through the hand-operated part, and which is coiled up and put under strain when actuating the meter, while it is adapted to assist the meter when passing gas, so that the automatic mechanism does not put any extra work on the meter. Or, the spring may be of such strength as to assist in driving the meter, so as to increase the pressure of gas supplied through it.

In one case, one end of a coil or bent spring would be connected with the setting wheel actuated by hand, and the other with a shaft or part driven by the meter; so that when the spring is put under tension at one end, this stress extension is transmitted through the other end to the part of the mechanism driven by the meter.

The engraving illustrates the invention above described, as applied to a gas-meter. Fig. 1 is a sectional front elevation; fig. 2, a side elevation; and fig. 3, a plan of the apparatus. Fig. 4 is an outside view, showing a part of the reverse side to that illustrated in fig. 1.

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**Purifying Gases and Obtaining Bye-Products.**—Theisen, E., of Baden-Baden, Germany. No. 27,389; Dec. 28, 1898.

In his specification, the patentee remarks that various methods have been proposed for obtaining an energetic reciprocal action between gases and liquids brought in contact by centrifugal action; and such a method was described in his patent No. 16,726 of 1892. But in many cases the action of the gases merely upon the surface of the liquid is not sufficient, even when such surface is increased by imparting a corrugated form thereto. The present invention, therefore, has for its object to produce a more energetic reciprocal action between gases and liquids; and "it relates more particularly to the treatment of waste gases from coke-ovens and the like, for the purpose of effecting the rapid purification and cooling thereof, as also for obtaining strong ammonia and benzene, which operations require a much more intensive reaction between the gas and water than was possible with apparatus heretofore proposed, at any rate, if it be desired to carry out the process with moderate-sized apparatus." The absorbing and cooling property of the washing liquid when operating during a very short time is increased, according to the present invention, by producing at the first contact of the hot gases and the liquid a strong evaporation, accompanied, if necessary, with pulverization of the washing liquid. In thus producing a very intimate mixture of the waste gases to be treated with the steam produced, the action is greatly increased by, to a certain extent, a molecular division of the bodies. By this means, the absorption of the ammonia is considerably accelerated, and also the cooling is greatly facilitated. The process, therefore, has to be so conducted in the first division of a centrifugal apparatus that an energetic evaporation and intermixture of the produced steam with the waste gases can take place—that is to say, as little washing liquid must be

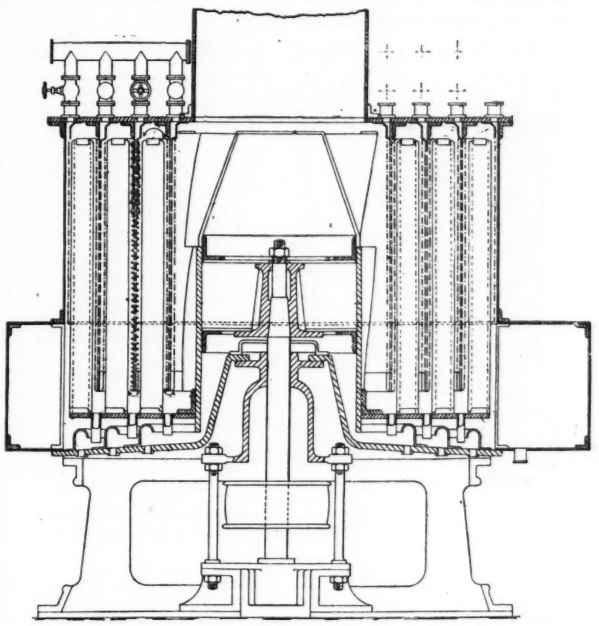


*Fig. 1.*

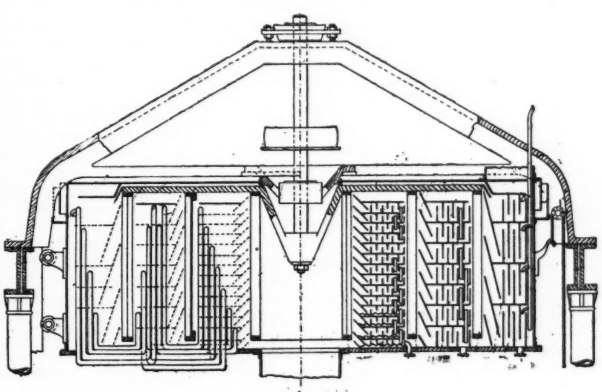


*Fig. 2.*

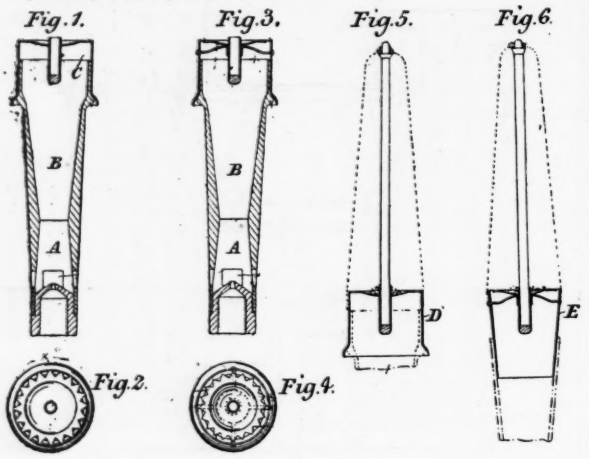
supplied as possible. It will be advisable to heat this in the first instance by suitable means, either externally to or within the centrifugal apparatus; and arrangements must be provided to cover a maximum extent of surface with a minimum of water or other washing or absorbing liquid.

The ideal arrangement would be that only so much water is supplied as is required for evaporation; so that in the first division no discharge of liquid would take place. This, however, as the patentee remarks, cannot be practically attained. At the second stage of the process, on the other hand, a strong cooling action is sought to be obtained, whereby the previously generated steam is condensed, together with the constituents absorbed thereby. This condensation can also be effected by simple surface-action, producing an effectual separation of the watery particles. By such a treatment of coke-oven gases, washing liquors are obtained which are to a considerable extent enriched with ammonia, but not so perfectly as is desirable, both for its advantageous subsequent utilization, and for purifying the gases to the greatest possible extent. For this purpose, the washing liquid is subjected to a second treatment by centrifugal action, together with the gases, in such manner that the gases are made to penetrate through the liquid over extended surfaces; the arrangement being such that the weaker liquid is brought in contact in the outer compartments of a centrifugal apparatus with the most purified gases, and in then travelling in the direction towards the axis of the apparatus become more and more enriched by contact with the more impure gases. In particular, the arrangement is such that several concentric stationary compartments are provided, consisting of syphon-like cells; and in the spaces between the compartments centrifugal blades are made to revolve, which exercise on the inner side a sucking action, and on the outer side a forcing action, on the gases. In this way, it is possible, not only to force the gases through all the cells of all the compartments from the interior to the exterior, but also at the same time to produce a continuous flow of the liquid from the outer compartments to the inner ones, on account of the increasing pressure towards the outside producing a difference of liquid level in the inner and outer cells. By this means, the requisite reversed direction of the gas and liquid is obtained.

Fig. 1 shows a vertical section of the apparatus for carrying out the first stage of the above-named operations; and fig. 2, a similar view of the plant for the second stage.

**Incandescent Burners and Mantle Supports.**—Duncan, J. H. H., of Coleman Street, E.C. No. 631; Jan. 10, 1899.

This invention has reference to bunsen burners suitable for burning a mixture of air and gas in contact with a mantle or other refractory body, for producing light by incandescence—for instance, such as are described in the patent of F. de Mare, No. 10,497 of 1894—and to further improvements in the invention which is the subject of a former application by the present patentee (No. 27,205 of 1898).




Figs. 1 and 2 show, in vertical section and plan, one construction of burner according to this invention. Figs. 3 and 4 are similar views, showing a modification.

The upper end or head of the burner-tube, through which the mixture of air and gas is supplied, and which comprises a lower conical portion A with air-inlet, an inverted conical intermediate portion B, and a head portion C, is provided at the top with a plate having a notched, serrated, or like periphery (such as is already in use in burners of this class), arranged either in contact with the wall of the head of the burner-tube, as shown in figs. 1 and 2, so as to form therewith a series of holes of angular shape, or at a short distance from the wall, as shown in figs. 3 and 4, so as to form therewith a single annular hole having a notched inner periphery, through which holes the mixture of air and gas can flow upward direct from the burner-tube below, and be burnt in contact with a mantle above, and without any internal perforated shell, such as is shown in De Mare's specification, or such as is now used in burners of this class. In this way, there can be obtained, in a simple manner, says the patentee, "a flame having a high heating power, and specially suitable for incandescence gas lighting." The irregular edge of the said plate is, or may advantageously be, slightly bevelled, so as to be inclined in an upward and outward direction.

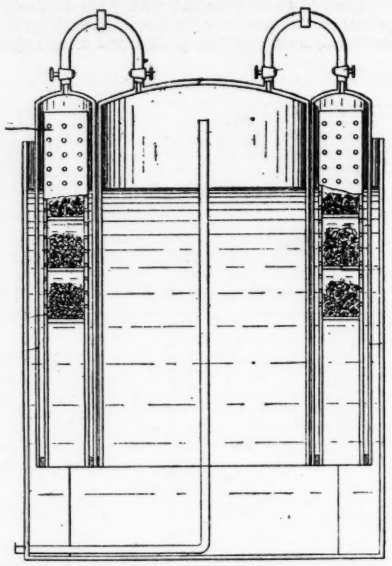
Figs. 5 and 6 show a form of apparatus in which the top plate, having the notched or serrated periphery, is supported by a suitable holder such as a cap D (fig. 5) or a plug E (fig. 6), that is adapted to be readily applied to the part of the upper end or head of the burner-tube, either by fitting over or into the same. To the central portion of the top plate is fixed the lower end of the mantle support, to the upper end of which the upper end of the mantle is permanently fixed; the lower end of the mantle fitting loosely around the cap or lower holder. The top plate may be formed in one piece with the cap, as in fig. 5, or separate from it, as in fig. 6. The arrangement is such that the top plate, cap, or holder, mantle support, and mantle constitute practically one article, that can be readily packed and transmitted from place to place, and be readily handled with little liability of breaking the mantle, or of setting it in an inefficient position on the burner-tube. The central portion of the top plate, which is solid, is provided with a socket, and the mantle support is fixed therein by plaster of paris, steatite, cement, or like material; such material serving also to retard the escape of heat from the centre of the burner along the mantle support. The top of the mantle may be fixed to the support by like material.

**Acetylene Generators.**—Boult, A. J.; a communication from M. de Lasserve, of Issac, France. No. 4054; Feb. 23, 1899.

This acetylene apparatus comprises a bell serving as a gasholder, and two or more generators so connected with the holder as to ascend and descend with it. The vessels containing the carbide are preferably arranged (as shown) diametrically opposite to each other on the bell or holder, which therefore ascends and descends with them as one body. They are all immersed together in the same water; and as soon as the bell has descended sufficiently, owing to the consumption of its gas, for the water-level to reach and wet the carbide charges, the bell becomes again filled with gas and rises. The vessel into which the bell and generators extend or are immersed is connected to the bell when the operation is about to commence. Each generator is composed of a bell or outer vessel, provided in the interior with a second vessel or cylinder, perforated at its upper part, and carrying the carbide on trays, baskets, or the like.

The gas as produced passes through tubes provided with taps and connecting joints into the holder, the tubes of which are also provided with taps; and from the bell the gas flows through a tube to the distributing pipes or place of use.

In order to start the apparatus, the bell is made to descend in the vessel partly filled with water; the taps on the top of the bell being left open. The carbide having been distributed on the trays or receptacles of the perforated cylinders, the bells are fastened to them by suitable means. The gas-generators are then placed in the tank or outer vessel, leaving the taps on the top of the generator-bells open. They are closed only when the water from beneath has reached the carbide, which position may be indicated by a mark on the outside of the gas-generators. The generators are then connected up to the gasholder bell, and the joints screwed together. The generator-taps are gradually opened, to let some of the air out; and the carbide becoming attacked by the water, genera-



tion of gas begins. The gas given off enters the main bell, and causes it (together with the generators) to ascend; the carbide being thereby raised out of contact with the water. The generation of gas thereupon stops, until the consumption or drawing off of gas from the main bell causes the whole to again descend, and the process to be repeated until all the carbide is exhausted.

**Prepayment Attachments for Gas-Meters.**—Brooks, A. G.; a communication from the New Haven Novelty Machine Company, of New Haven, U.S.A. No. 21,175; Oct. 24, 1899.

A very general indication only can be given of the scope of this invention, as the specification filed in respect to it extends to no less than 16 pages, embracing 32 distinct claims; and there are seven sheets of detail drawings. It may suffice, however, to say that the attachment constituting the subject-matter of the application involves in its construction a rotative slidable shaft controlling the action of the gas-regulating valve; the shaft deriving its movement to open the valve from a toothed operating wheel loosely "splined" on the shaft, and a money-carrier mounted loosely to be rotated on the shaft freely in but one direction. The money-carrier has an engaging device, which, acted upon by a coin thrust into the money-carrier, is made to couple the money-carrier temporarily with the toothed wheel, so that rotation of the money-carrier by hand will rotate the toothed wheel and its shaft, and at the same time effect the sliding of the shaft in a direction to open the valve. The extent of rotation of the shaft and its consequent longitudinal movement depends on the greater or less extent of its rotation, while the coin in the money-carrier acts to effect the coupling of the money-carrier with the toothed wheel by or through the engaging device—the time being governed by a "delivery regulator." This device is under the control of the operator, and is capable of being adjusted from time to time as the price of gas varies, to thereby ensure the delivery to the consumer of a quantity of gas the equivalent of the unit coin used. The regulator is cylindrical, and surrounds the money-carrier. It is provided with a stop, whereby the money can be discharged through a throat or opening in the regulator, and from thence pass into a tray or box. The organization of parts is such that it can be applied to any of the existing types of meters without changing the latter.

**Automatic Gas Lighters.**—Killing, C., of Düsseldorf, Germany. No. 22,027; Nov. 3, 1899.

Giving a brief review of former inventions in the same line, the present patentee says: Döbereiner produced "igniting pills" by mixing porous earthenware or clay and spongy platinum with water, so as to form a paste, which was then moulded into balls of the size of peas, subsequently dried and calcined. J. F. Duke impregnated ready-made meerschaum-pills with a solution of a platinum salt, which was then dried and reduced by means of suitable gases. J. Perl discovered that the igniting pills produced in this manner soon lost their capacity of igniting gases; and to avoid this defect, he treated the pills (after impregnating with platinum chloride, drying, and reducing) with dilute hydrochloric acid and finally with boiling water. His own (Killing's) experiments have shown that these automatic igniting pills work very well if they are used in the first instance—always with the aid of one or more wires—for igniting a small auxiliary flame, which in its turn ignites the main gas current, and is subsequently extinguished, so that the igniting pill is no longer touched by the flame. They are useful, also, in case the igniting pill directly lights the main gas current, and immediately afterwards is switched out of the reach of the flame by means of a thermostatic spring. Such pills will not stand prolonged exposure to the flame.

In order to produce fireproof igniting pills, he proposes to proceed as follows: Pills made from meerschaum or other porous mineral matter are first impregnated with a solution of a salt of a rare earth—preferably a thorium salt; subsequently dried and calcined. The pills will thus be coated in their pores, as well as outside, with a thin layer of a refractory rare earth, in the shape of an oxide remaining behind after calcination. The pills prepared as described are then impregnated with platinum chloride, dried and reduced. Instead of applying the two solutions consecutively, a soluble salt of a rare earth may be added to the platinum

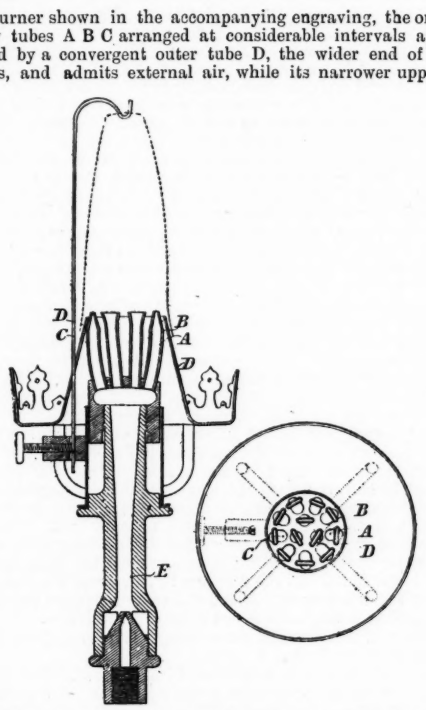
solution, and the pills impregnated with this double solution, subsequently dried and reduced.

Dwelling on the merits of his discovery, the patentee remarks: In the case of combustible woven fabrics saturated with a solution of thorium and platinum salts, it is frequently observed that after prolonged use the igniting mass gives off particles of dust—probably in consequence of its frothy condition—and that this loss increases with time, apparently owing to the vibrations caused by each ignition. The fine dust of platinum black, when it settles on the mantle, reduces its luminosity to such an extent, that the light (which at the beginning may be equal to 70 Hefner candles) will in some cases drop to 25 or 30 candles. Such a dispersion of the platinum black in the shape of dust will not take place in the case of meerschaum pills, "consequently the use of pills which have been manufactured by the process described above constitutes an important industrial progress in comparison with the use of woven igniting fabrics."

**Acetylene Gas-Burners for Use with Incandescing Mantles.**—Johnson, J. Y.; a communication from the Compagnie Française de l'Acetylène, of Paris. No. 23,032; Nov. 18, 1899.

The object of this invention is to provide means for overcoming certain difficulties existing when mantles of rare earths are employed with mixtures of acetylene gas and air. The patentees propose that the mixture of acetylene and air should escape through orifices narrow enough to prevent back-firing through them. But this alone is not sufficient, they remark, as if, through a sufficiently narrow orifice, a completely combustible mixture of air and acetylene gas (say, one of 93 per cent. of air and 7 per cent. of acetylene) issues at a speed of 4 metres per second, corresponding to about 1 millimetre of pressure, the propagating or spreading velocity is upwards of 6 metres, and the flame will tend to re-enter the orifice at a speed of 6 metres *minus* 4 metres. The flame is checked by the cooling effect produced upon it by the walls of the orifice; but these walls gradually become so heated that back-firing takes place. This would be prevented from occurring if the speed with which the mixture of air and acetylene escapes exceeds the propagating or spreading velocity (6 metres in the example given). It is, however, very difficult in the case of injectors arranged for the usual acetylene pressure—from 12 to 13 centimetres of water—to obtain an adequate amount of energy to ensure the passage of the mixture through the narrow orifice of the burner at so high a speed. To overcome this difficulty, the mixture of air and acetylene is so proportioned as to contain less air than is theoretically necessary for complete combustion. In such a mixture, the spreading velocity of the flame is under 6 metres; and it therefore becomes possible to cause the mixture to issue at a rate of speed practically equal to that of the spreading velocity. The heating of the material in which the orifices are formed is then kept sufficiently low; the heat imparted thereto being abstracted at an almost equal rate by the heat-conducting property of the material. "But as the gas mixture is not sufficiently rich in air, it would not be capable of illuminating the mantle in a manner satisfactory on economical grounds."

In the burner shown in the accompanying engraving, the orifices are formed by tubes A B C arranged at considerable intervals apart, and surrounded by a convergent outer tube D, the wider end of which is downwards, and admits external air, while its narrower upper end is




within the lower part of the mantle. The air issuing through this narrower end is distributed around the centre tubes and the flames therefrom, and effects complete combustion of the gas.

The tubes, in order to prevent an inward return of their flames, should (the specification remarks) have very small diameters; and, even then, it would be impossible to overcome by the power of the injector alone the resistance they would offer to the passage of the gas mixture. To reduce this as much as possible, while at the same time increasing the efficiency of the injector, instead of employing tubes which theoretically should be 1 millimetre in diameter at most, tubes are employed which are of a diameter of several millimetres each, and which consequently offer far less resistance to the passage of the gas mixture. These tubes are flattened at their outlet ends, so that their sectional outline is approximately rectangular, and so narrow as to prevent back-firing.

The passage into which the acetylene is injected consists of a narrow cylindrical portion E, flaring at its lower part, and continued above by a conical portion, the walls of which are slightly inclined. Into the cylindrical part, through its lower flaring end, the air and gas pass from the injector at a high speed; but in the conical part, the speed of the mixture of gas and air becomes gradually lessened, and its pressure increased.

## APPLICATIONS FOR LETTERS PATENT.

402.—Joel, H. F., "Street lamps and reflectors." Jan. 8.
410.—Duff, E. J., "Gas-producers." Jan. 8.
479.—Parsons, R. C., and Belfield, R., "Utilization of the heat developed by explosion or ignition of a combustible gas." Jan. 8.
541.—Eisenhuth, J. W., "Air and gas engines." Jan. 9.
602.—Winterflood, J., "Water-heaters." Jan. 10.
755.—Tatham, J. E., and Cope, J. L., "Gas-burners." Jan. 12.
756.—Croizat, V., "Lighting and extinguishing street-lamps." Jan. 12.
769.—Bryant, C. H., and Augspurg, G. T., "Compressing gas." Jan. 12.
770.—Hein, R., and Hahn, T., "Gas pressure-regulators." Jan. 12.
792.—Birch, G., "Incandescent gas-burners." Jan. 13.
796.—Alba, F. de A. "Gas or oil engines." Jan. 13.
797.—Hislop, R. F., "Lighting and extinguishing gas-lamps." Jan. 13.
810.—Hunger, F. O., and Espenhayn, W., "Liquid meters." Jan. 13.
829.—Gillett, E. H. J. C., "Starting gas and other engines." Jan. 13.
830.—Peck, W., "Carburetting air." Jan. 13.

# CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

### Tar and Liquor Storage-Tanks.

Sir,—In connection with the recent accident at the Douglas Gas-Works, Mr. Newbigging stated in his evidence that he always put ventilating shafts into tar and liquor tanks. He also suggested the ventilation of such tanks generally. The subject of ventilating these tanks is, in my opinion, a debateable one. I have always made it a practice to keep all tar and liquor boshes, wells, and storage tanks, as far as possible closed up, not allowing any ventilation. It has frequently been demonstrated that the gases evolved from the tar and liquor wells are of an explosive nature. Further than this, if the gases are allowed to escape through ventilating shafts, or by other means, considerable loss of ammonia is occasioned. Not only so, but the ammonia gas has a deteriorating effect upon everything with which it comes in contact; leaving a well-known bluish tint on the surface exposed to its action.

It would be interesting to know what is the general practice prevailing. I have certainly not come across ventilating shafts, or even open gratings which may be sources of danger. Perhaps I have misunderstood Mr. Newbigging's point.

*Huddersfield, Jan.* 19, 1900. Edward A. Harman.

### The Scarcity of Coal.

Sir,—I have been much impressed with the justness of the remarks on the above subject in the last issue of the "Journal;" and I will, with your permission, offer a few observations thereon. I presume that many, like myself, who bought ample coal supply in the proper season, have experienced serious difficulty in getting anything like their contract quantity during the past few weeks; and as the evil has by no means entirely abated, the question naturally arises as the how it is to be prevented in the future. If we have to get in all our coal in the summer, we shall need much ampler storage accommodation and increased means of moving the material expeditiously. In my opinion, it is a matter to which the immediate attention of all concerned, whether manufacturers of gas plant or engineers of gas-works, ought to be directed.

Most managers who have written, as I have done, to coalowners to urge on deliveries, have had letters putting all the blame on the railway people. I should be glad to hear if those who depend on water carriage have had any difficulty in getting supplies. But, whether or not, I have a good many private trucks running to and from the colliery and the works; and I find the only delay is on the return journey. I am pleased to say that since the fog I have had no difficulty in getting coal in and unloaded in three days from the date of the invoice, each inclusive; but I find that these waggons are eight and ten days on the return journey—that is, between the date of discharge and date of invoicing again. The coincidence is remarkable, and leads one to suspect that there is some truth in the remark lately made to me jocularly by a colliery official. "You don't expect us," he said, "to send you coal under contract when we can get 7s. or 8s. a ton more for it in the open market." There is not, I think, the slightest doubt that the collieries, with some brilliant exceptions, have sold contract coal, at advanced prices, to people who have not contracted; and they are now blaming the Railway Companies for a fault which is by no means wholly theirs. I do not for a moment contend that the Companies are free from blame in this matter; but when one hears reports of customers of Colliery Companies pressing forward with offers of even more than advanced list prices for coal, one is scarcely surprised at there being often no coal to spare for contract supplies. I hope all managers who have been suffering in a similar manner to myself will endeavour to locate the principal cause of the evil, with the view of bearing it in mind when they are next buying coal.

*Jan.* 20, 1900. Verax.

**Explosion of a Gas-Main at Douglas (Isle of Man).**—On the evening of Saturday, the 13th inst., the 8-inch gas-main running along Victoria Street, Douglas—the principal thoroughfare in the town—exploded opposite the Salisbury Hotel. There were a good many people in the street at the time; but fortunately no one was injured. The supply to the hotel was cut off; and, in order to repair the fracture in the pipe, which it was thought had been caused by a traction-engine, part of the town had to be deprived of its gas supply.

# PARLIAMENTARY INTELLIGENCE.

## PRIVATE BILLS (SESSION 1900).

### Opposition on Standing Orders.

On Tuesday last, the final day for despositing memorials complaining of non-compliance with Standing Orders in the case of the second hundred Bills in the General List of Petitions, no memorials had been received in respect of those in which our readers are interested. The following Bills will not, therefore, be opposed on Standing Orders: Airdrie, Coatbridge, and District Water Bill, Barnsley Corporation Bill, Bristol Water Bill, Bury and District Water-Works (Transfer) Bill, Cleethorpes Gas Bill, Crowborough District Water Bill, Dorking Water Bill, Dublin Corporation Bill, East Shropshire Water Bill, Exmouth Urban District Water Bill, Falkirk and District Water Bill, Falkirk Corporation Gas and Extension Bill, Gaslight and Coke Company Bill, Hamilton Burgh Bill, Hartlepool Gas and Water Bill, Kingston-upon-Thames Gas Bill, Lambeth Water Bill, London Sea Water Supply Bill, Maidenhead Gas Bill, Menstone Water-Works (Transfer) Bill, Metropolitan Water Companies Bill, Motherwell Water Bill, Mountain Ash Water Bill, Newport (Mon.) Gas Bill, Ramsgate Corporation Improvement Bill, Rickmansworth and Uxbridge Valley Water Bill, Scarborough Corporation Bill, Southport Water Bill, Sutton District Water Bill, Taunton Corporation Bill, Tottenham Urban District Council Bill, Wandsworth and Putney Gas Bill, West Bromwich Corporation Bill, Wetherby District Water Bill, Wolverhampton Gas Bill.

The memorial of Mr. John Griffiths, complaining of non-compliance with Standing Orders in the case of the petition for the London Water (Welsh Supply) Bill, came before one of the Examiners on Thursday, and was adjourned till next Friday.

# LEGAL INTELLIGENCE.

## SUPREME COURT OF JUDICATURE.—COURT OF APPEAL.

### Wednesday, Jan. 17.

(*Before the* MASTER OF THE ROLLS *and Lords Justices* VAUGHAN WILLIAMS *and* ROMER.)

### Welsbach Incandescent Gas-Light Company, Limited, v. New Sunlight Incandescent Company, Limited.

This was an appeal by the defendants from the decision of Mr. Justice Byrne on the 12th inst. (see *ante*, p. 153).

Mr. BOUSFIELD, Q.C., and Mr. NEILL appeared for the appellants; Mr. MOULTON, Q.C., Mr. T. TERRELL, Q.C., and Mr. WALTER represented the respondents.

Mr. BOUSFIELD said this was an appeal in an action brought by the plaintiffs to restrain infringement of their 1893 patent, on an application by the defendants to administer interrogatories to two Directors and the Chemist of the Welsbach Company. The patent of 1893 was taken out by Mr. Imray as a communication from Mr. Moeller, the Managing Director of the Company's predecessors, for a particular improvement in incandescent lighting—viz., making mantles of a certain fluid composed of 98 per cent. of thorium and 2 per cent. of cerium. In 1891 and 1892, the plaintiffs' predecessors were receiving from Germany a new lighting fluid from Dr. Welsbach for the manufacture of mantles; and the defendants' case was that this fluid was practically identical with the 1893 patent.

Lord Juctice ROMER: I suppose you want to prove anticipation.

Mr. BOUSFIELD said that was so. Defendants' case was that the plaintiffs were getting this thorium and cerium from Germany, and making mantles from it; and that in 1893 Mr. Moeller went abroad and sent a communication to Mr. Imray. The interrogatories were directed to this point. In 1897, a reconstruction took place—the business of the Company being passed over to the plaintiff Company; and Mr. Moeller, Mr. De Fonblanque, and Mr. Mackean's services were transferred to the new Company. His application was for leave to interrogate these gentlemen, who had been connected with the old Company, in preference to the Secretary of the new Company, who knew nothing of what took place in 1892 and 1893.

After a long discussion, their LORDSHIPS dismissed the appeal; stating that the point raised was an extremely important one, and might have to be determined at some future date, after it was seen how the Secretary answered the interrogatories.

## HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

### Friday, Jan. 19.

(*Before Mr. Justice* LAWRANCE *and a Special Jury.*)

### Sheldrake v. Duncan.

This was an action to recover damages for slander uttered by the defendant, who is Chairman of the New Sunlight Incandescent Company, at a meeting of shareholders held on March 9, 1899, in respect of the plaintiff, Mr. J. H. Sheldrake, formerly Manager of the Sunlight Company, and now in the employ of the Welsbach Company. The slander complained of was contained in the following passage of Mr. Duncan's speech: "In the past year, the turnover would have been considerably larger than it was had we not been met by two circumstances which bore upon us very badly in the beginning of the season. Our Manager [meaning the plaintiff] was taken away by the opposition [meaning the Welsbach Company] who offered him just double the amount of money that we were paying him. He was under contract for five years. But he snapped his fingers at the contract, and took the other position; and we felt we should not be doing much good by keeping a discontented man, and we were hardly prepared to give him the money that the other people [meaning the Welsbach Company] offered him. I do not know that we did right in not forcing him to stop, because we had great difficulty in finding anyone to replace him; and it was not till after a good many months that we hit upon our present system of management, which has continued ever since."

Mr. DICKENS, Q.C., and Mr. CARRINGTON appeared for the plaintiff; Mr. CARSON, Q.C., and Mr. F. ABRAHAMS represented the defendant.

Mr. DICKENS, in opening the case, said that the plaintiff was a well-known gas engineer and gas expert; and his only object in bringing this action was to clear his character from the aspersion cast upon him by Mr. Duncan, which could not fail otherwise to have a bad effect with the various gas companies and gas interests with which plaintiff was connected.

*Plaintiff* was then called, and examined by Mr. CARRINGTON. He said he was a Gas Engineer, and had been engaged in the industry for many years. He was introduced by Professor Lewes to Mr. Duncan, the present Chairman of the Sunlight Incandescent Company, in November, 1896. They discussed the management of the concern. Mr. Duncan, who was then a Director, said they had been obliged to get rid of their Manager. Terms were discussed; and £600 a year, and commission on profits after the payment of 6 per cent., was agreed to. An appointment was made to meet the Directors of the Company on the following day. At that meeting, he asked for an agreement for three or five years; but the Directors said they would not offer more than a twelve months' engagement, and it appeared that they had had to pay £1000 to terminate a previous engagement of the kind. After he had been with the Company about a week, a written agreement for five years was sent to him; but he never signed it, as by reason of the condition in which he found the Company he was rather timid of being tied. He continued in the service of the Company until October, 1897, when Mr. Duncan wanted to claim for the Company a patent witness had taken out. Mr. Duncan then called attention to the agreement; but witness pointed out that it had never been signed. Mr. Duncan then said he would draft an agreement under which witness and the Company should share in the benefit of the patent. In November, witness was approached by the Welsbach Company, who wanted to know if he was tied to the Sunlight Company. Witness replied that he did not consider that he was, as he had never signed an agreement, and his year would close on Nov. 23. On Nov. 15, he received the second draft agreement from Mr. Duncan, dated Nov. 1, 1897, which provided for a year's service by witness, and contained a provision also that in the event of Mr. Sheldrake making discovery of any inventions and improvements in connection with incandescent gas lighting, the same should be forthwith communicated to the Company, who should have the option (to be exercised at any time within three months, by notice in writing) to take over the benefits of such improvements, Mr. Sheldrake to have one-fourth share of such benefit. Mr. Duncan had also drafted an addition in pencil, to make the operation of this clause retrospective. On the 16th, witness met Mr. Moeller, the Manager of the Welsbach Company, and agreed to a five years' agreement for £1000 a year without commission; the Company to have the benefit of witness's inventions and patents, subject, of course, to the approval of the Directors. When witness communicated this fact to Mr. Duncan, the latter asked what his Company were to do for a Manager; and witness said he would do all he could to initiate his successor into the business. Mr. Duncan subsequently wrote that he considered plaintiff not only morally, but legally, bound to the Sunlight Company for five years. Witness wrote in reply that he did not consider himself bound; and he afterwards saw Mr. Duncan on the subject, and gave an undertaking as to not divulging trade secrets. He continued until the end of the year in the employ of the Sunlight Company, and then went to the Welsbach Company. Until March, 1899, he heard nothing either from Mr. Duncan or the Sunlight Company as to the circumstances under which he had left. He had previously been approached by the Welsbach Company, but was then under agreement. Personally he had never approached the Welsbach Company. On March 9, his attention was directed to a report in the "Financial Times," where the following passage appeared: "There were one or two other matters that had told against them during the past year. In the first place, their Manager had been tempted to go over to their rivals by the offer of twice the remuneration he was receiving; and he had snapped his fingers at the five years' contract he was under with the Company. This had caused a good deal of difficulty, as it was only within the last six months that the Directors had been able to secure proper management." In consequence of demands for an explanation by the Welsbach Company, witness communicated with his Solicitors.

In cross-examination by Mr. CARSON, plaintiff said that the Welsbach Company and the Sunlight Company were rivals; and in his own time there had been a good deal of litigation between them. At the date of his arrangement with Mr. Duncan, nothing was said about a five years' agreement depending upon his services proving satisfactory in the first year; but he had written to Mr. Duncan making a proposal to that effect. He received nothing in excess of £600 a year by way of commission on the profits, as the Company were working at a loss. Witness did not sign the first agreement, because after he had been with the Sunlight Company for some time he found that the mantles being made were not as they ought to be. In the first month it was nothing but goods coming back; and he was very dissatisfied at having ever gone there. His object in not signing the agreement was to leave himself free.

Mr. CARSON: If you could get nothing better, to stay on there; if you could get anything better, to leave?

*Witness* said he had no intention of leaving; nor did he seek anything. He asked for better terms as to commission, and discussed the matter with Mr. Duncan. A general meeting of the shareholders was held on Oct. 26, 1897, at which he was present; and Mr. Duncan spoke of the advantage to the Company of having secured his services. Notwithstanding this, within a month he went over to the rival "shop;" the fact being that he could not get a proper arrangement with the Sunlight Company.

Re-examined by Mr. DICKENS: Witness had no notice from the Sunlight Company that they intended to exercise the five years' option; and Mr. Duncan did not suggest it in conversation. It was understood in October, 1897, that a draft agreement was to be drawn up before anything further was done in the matter. On Nov. 16, Mr. Duncan knew that he had been negotiating with Mr. Moeller; but there was no suggestion then made that the Company wished to exercise their option, and Mr. Duncan did not hint that witness had done anything dishonourable. He was asked by the Secretary of the Sunlight Company three times to sign the

first agreement; but, as he had told Mr. Duncan, he did not sign because the goods sold were not as advertised. There was, for instance, no "white mantle" as advertised.

This being the plaintiff's case,

Mr. CARSON submitted that there was nothing to go to the Jury on the question of slander. No special damage had been shown; and no charge had been made against the plaintiff in his capacity of engineer. The remarks of the Chairman at the general meeting in 1897, rather showed the great loss the Company sustained in losing him. In the first place, to say that a man had broken his contract was not slander; secondly, he contended that the occasion was privileged—the occasion being the address of the Chairman to his shareholders explaining the circumstances under which the Manager had left.

Justice LAWRANCE: That is a question for me.

Mr. CARSON said there was no evidence of express malice.

Justice LAWRANCE: That is a question for the Jury. That the occasion was privileged, I think there can be no doubt; but whether the communication was privileged, will depend upon the finding of the Jury.

Mr. CARSON said if his Lordship held that the occasion was privileged, there was nothing to go to the Jury, unless there was evidence of express malice, of which there was none. There was nothing to indicate that Mr. Duncan had anything but a feeling of friendship towards plaintiff, and this feeling was shown on every occasion in which he came into contact with him, and in the handsome words spoken at the meeting of the shareholders in October, 1897. To say, therefore, that Mr. Duncan was actuated by malice, was absolutely absurd. On the other hand, what did the Jury think of the plaintiff having made terms with the Welsbach Company without the knowledge of his employers? There were very few expert persons who could be secured to carry on this new business of manufacturing the "Sunlight" mantles; and no doubt Mr. Duncan and his Board were upset as the result of the plaintiff's leaving. The business was thrown out of gear; and six months elapsed before the Company could put it again on a satisfactory basis. The profits hoped to accrue from the energetic management of Mr. Sheldrake in the early part of 1898, were not realized; and consequently next time Mr. Duncan met his shareholders—in March, 1899—he had to give an explanation of what had happened as regarded Mr. Sheldrake. He was bound to do this, as otherwise he could not justify what he had said on the previous occasion. Slander and libel actions should have a real and substantial basis, and not be brought in respect of what a man said in the performance of his duty to his Company. Mr. Duncan had had no object except to properly inform his own shareholders of what had occurred.

*Defendant*, in answer to Mr. ABRAHAMS, said he was now Chairman of the reconstructed Sunlight Company; and in 1896 he was a Director. For years past the Sunlight Company had been in litigation with the Welsbach Company in respect of patents. Plaintiff was engaged for a year, with the option to the Company of subsequently retaining his services for five years. The agreement was sent to the plaintiff, but never signed. With regard to plaintiff's patent, he was under the impression that it was covered by the agreement—especially as he knew that it had been in part worked out during the time plaintiff should have devoted to the Company, and to some extent by their servants—and he therefore claimed the patent as belonging to the Company. He then found out, for the first time, that Mr. Sheldrake considered it was not covered by the agreement; and reference to the agreement showed that Mr. Sheldrake had not signed his part of it. This brought out the further fact that the reason he had not signed was, as plaintiff had stated, that he was not going to get anything upon the commission, and that therefore the agreement would be a bargain for £600 a year net, without any increase. Witness admitted that the business had not been as prosperous as expected, and discussed the question of how to compensate plaintiff for that. Partly, the compensation proposed was that plaintiff was to have 25 per cent. royalty on any inventions he might submit to the Company; and the Company were to do away with the engagement by which they were to pay dividends before allowing plaintiff a share in the profits. It was further proposed that plaintiff should have £250 in cash on account of royalties. The Company's Solicitor was instructed to prepare a draft agreement on these terms. The announcement of the engagement of the plaintiff with the Welsbach Company came upon the Directors quite as a surprise. In making the remarks referred to at the meeting in March, 1899, he had no animosity or ill-feeling towards Mr. Sheldrake; and he had none now. He had no other object in making the statement to the shareholders than to explain to them the facts; and he considered he was justified in the language he used.

In cross-examination by Mr. DICKENS, witness said he did not wish, at the meeting in March, 1899, to impute dishonourable conduct to the plaintiff, but only that he was ignorant of business usages and of his legal position. He thought plaintiff's action in going to the Welsbach Company was wrong; and he intended to convey that impression. He intended also to convey the impression that the Welsbach Company had done a dishonourable thing. It was not sufficient, in his opinion, to say at the meeting that the Company's Manager had become the Manager of the Welsbach Company, because to engage so valuable a Manager without securing him for a term of years would be considered a most unbusinesslike transaction. The speech was submitted before delivery to the other Directors; and it was agreed that what he was going to say with regard to Mr. Sheldrake was the minimum of what might be said. It was quite possible that, when Mr. Sheldrake first entered into negotiations, he wanted a five years' agreement without any option at all. He denied that the Company declined to give notice to continue the agreement for five years because it was found that they had no control over plaintiff's patents. The Company did not wish to have a five years' agreement, though they were willing to accede to it; but he considered it was to their advantage to have a year's agreement, with six months' notice.

Mr. DICKENS, in reply, said that no doubt the secret of Mr. Duncan's remarks at the meeting in March, 1899, was that he wished to make an attack on a rival undertaking. There could be no question that, both in law and in honour, Mr. Sheldrake was absolutely free to make any fresh arrangement. The occasion of Mr. Duncan's remarks was no doubt privileged; but the occasion was exceeded when Mr. Duncan gave a wrong and distorted version of the facts, and created an entirely erroneous impression among his hearers.

Justice LAWRANCE, in summing up, said that no claim could be made under the contemplated five years' agreement, because the option was never carried out; and it was obvious to any man of business that Mr. Sheldrake was perfectly free to make another arrangement, if the Company did not exercise their option. Then it was a question whether to say that Mr. Sheldrake "snapped his fingers at the contract" was a fair way of viewing his action. It was for the Jury to say whether defendant had exceeded his privilege, through being actuated by some indirect motive—such as anger with the Welsbach Company, or disappointment at his Company having done so badly. If the Jury thought the words were slanderous by reason that they imputed dishonourable conduct, plaintiff would be entitled to damages.

The Jury found for the plaintiff, and awarded him one farthing damages.

### Saturday, Nov. 20.

Mr. CARRINGTON announced that, after the rising of the Court, the Jury had returned a verdict for the plaintiff; and he had now to ask for judgment and for a certificate for a Special Jury.

Mr. ABRAHAMS observed that Mr. Carrington had not mentioned the amount of the damages awarded, which was one farthing; and under these circumstances, he had to apply to his Lordship to deprive the plaintiff of costs. The order provided that the costs should follow the event, unless the Judge for any cause should otherwise direct. He submitted that there was good cause in this case for depriving plaintiff of his costs. Plaintiff brought this action to vindicate his character, and alleged that he had been seriously slandered. The Jury had treated the complaint with contempt, and by their award had indicated that the action ought never to have been brought. It might be that they took the view that this was simply a squabble between two rival Incandescent Gas Companies, and that the action had been put forward on behalf of the Welsbach Company. The power to deprive a successful plaintiff of his costs had no doubt been given with a view to discouraging actions for libel or slander, unless serious injury had been done to a man's character.

Justice LAWRANCE said that he was not inclined to interfere. No doubt, under ordinary circumstances, if a man brought an action for slander, and was awarded only one farthing damages, it might be said that the case ought never to have been brought. Anyone sitting on the Bench was a good deal nearer to what went on among the Jury than those in the body of the Court; and he (the learned Judge) could not help hearing one gentleman say yesterday that he quite agreed with the summing up. There had no doubt been a compromise between the Jurymen; and he thought the attention of the Jury had been diverted from the real point—the real point being that plaintiff was slandered. The Jury found, indeed, that plaintiff was slandered; but when they came to the question of damages, they shifted their ground from the plaintiff altogether, and dealt with the matter on the ground that it was a squabble between two rival Companies. His view of the matter was that plaintiff ought not to suffer for that; and therefore he would not interfere.

Mr. ABRAHAMS: Your Lordship simply gives judgment, and certifies for a Special Jury.

Justice LAWRANCE: Yes.

## HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

### Friday, Jan. 19.

(*Before Justices* BRUCE *and* PHILLIMORE, *Sitting as a Divisional Court.*)

**London County Council v. East London Water-Works Company.**

In this case, Mr. ENGLISH HARRISON, Q.C., Mr. J. H. DRYDALE, and Mr. DALDY appeared for the London County Council; while Mr. C. A. CRIPPS, Q.C., M.P., and Mr. R. B. ACLAND represented the East London Water Company.

Mr. HARRISON said this was a special case, which had been stated by concurrence of the parties, raising certain questions of law for the opinion of the Court. The case stated that an action was commenced on Nov. 7, 1898, by a Writ of Summons, whereby the plaintiffs claimed a declaration that hydrants, fire-plugs, and other apparatus, provided or to be provided by the defendants pursuant to section 32 of the Metropolitan Fire Brigade Act, 1865 (28 and 29 Vict., cap. 90), and section 34 of the Metropolis Water Act, 1871 (34 and 35 Vict., cap. 113), or pursuant to either of these sections, ought not, in the absence of any agreement under section 4 of the London County Council (General Powers) Act, 1894 (57 and 58 Vict., cap. 212), or alternatively without the consent of the County Council, to be used for any purpose other than the supply of water for extinguishing fires, or alternatively for any purpose other than the supply of water for extinguishing fires and the purposes specified in section 37 of the Water-Works Clauses Act, 1847, and an injunction of the Court and any further or other relief to which plaintiffs might be entitled. The six hydrants to which the action more particularly related were situated in Dalston Lane, Queen's Road, Downs Road, Well Street, and two in Brooksby's Walk. In and between the months of July and September, 1897, the streets above referred to were respectively in course of being paved with wood and channelled; and the defendants from time to time during those months, without having obtained or asked the consent of the plaintiffs, used, and allowed those engaged in the operations to use, these hydrants for the purpose of obtaining from the water-mains by means of such hydrants, a supply of water for the operations of paving and channelling. Plaintiffs contended that the hydrants in question were provided, at the public expense, specially for the purpose of extinguishing fires, and could not (save pursuant to an agreement under section 4 of the London County Council General Powers Act, 1894) lawfully be used, or at any rate could not be lawfully used without the consent of the plaintiffs, except for the extinguishing of fires; and alternatively could not be used for any purposes other than those specified in section 37 of the Water-Works Clauses Act, and ought not in any event to be used by persons other than servants of the defendants. Defendants contended that they were entitled to themselves use the hydrants for all purposes, and at such times and in such manner as they thought fit. Defendants had used, or permitted to be used, the hydrants for giving temporary supplies of water

during paving and other similar works, and during severe frosts, and other exceptional circumstances; and they had been requested to cease and discontinue such user, but had refused to do so, and had continued to allow the use of the hydrants for the purposes above specified, without any agreement with, or consent of, the plaintiffs. The hydrants in question were provided by defendants, at the request of the Metropolitan Board of Works, in March, 1888, and shortly after that time—the request having been made under the provisions of section 32 of the Metropolitan Fire Brigade Act, 1865, and section 34 of the Metropolis Water Act, 1871. The costs, charges, and expenses of the defendants for providing the hydrants had been paid them by the Metropolitan Board of Works or by plaintiffs as their successors. Subsequently the cover of number 1976 required to be raised to the level of the new pavement; and the work was executed by the defendants, and afterwards paid for by the plaintiffs. Save in this one instance, no works of maintenance or repair had been executed upon any of the hydrants. The hydrants in question were appliances attached to the water-mains in districts where such mains were kept constantly filled with water under pressure, for the purpose of enabling water to be drawn from the main at the point where the hydrant was placed. In defendants' district, as in most other parts of the Metropolis, a constant supply of water under pressure was now afforded; and consequent upon the introduction of this system, and the invention of the hydrant, the old fire-plugs were replaced by hydrants. As far as the Metropolis was concerned, the old fire-plug had therefore practically ceased to be used as a means of obtaining water to extinguish fires, though many still existed. The hydrants were designed and constructed with a view to their being certain in action and easy to manipulate; but unless the valve which they included was properly replaced, there was a liability to leakage of water, and in cold weather to the possible disablement of the hydrant by freezing. The hydrants were of a pattern specially selected by the County Council to meet the requirements of the Fire Brigade, and were periodically tested by the Fire Brigade. There were now in defendants' district some 3885 of the hydrants, of which 3585 had been provided by the Company at the request of the County Council or their predecessors. The remaining 300 had been provided by defendants of their own motion, and at their own expense; and no question arose as to these. The questions of law for the opinion of the Court were: Whether these hydrants, fire-plugs, and apparatus provided by defendants, in the absence of any agreement under the London County Council (General Powers) Act, 1894, could lawfully be used for any purpose in addition to the supply of water for extinguishing fires. Secondly, whether such additional user was limited to the purposes specified in section 37 of the Water-Works Clauses Act, 1847, or to any, and what, other purposes. Thirdly, whether such additional user might take place without the consent of the London County Council. Fourthly, whether such right of user was confined to the defendants themselves, or might, with the permission of the defendants, be exercised by persons other than the defendants. He now contended that the Council were entitled to the exclusive use of the hydrants for the purpose of extinguishing fires, and quoted the various sections applicable to the question. Section 32 of the Metropolitan Fire Brigade Act, 1865, provided that every Water Company to whom the Act applied "shall provide at the expense of the Metropolitan Board of Works—of whom the London County Council were the successors—in any mains or pipes within the Metropolis, plugs (declared in the Metropolis Water Act, 1871, to include hydrants and other apparatus for a supply of water from the Company's pipes in case of fire) for the supply of water in case of fire, at such places, of such dimensions, and in such form as the Board may require; and the Fire Brigade shall be at liberty to make such use thereof as they may deem necessary for the purpose of extinguishing any fire." Section 4 of the London County Council (General Powers) Act, 1894, provided that "it shall be lawful for the Council to enter into, and carry into effect, any agreement with the Companies' supplying water in London and the Vestries and District Boards of Works in London, or any of them respectively, with respect to the use of fire hydrants for flushing and other purposes;" and that the Company owning the main or pipe with which the hydrant was connected and the Local Authority (if any) to whom the hydrant belonged should be a party to such agreement. Section 37 of the Water-Works Clauses Act, 1847, provided that the Water Companies should, "in all the pipes to which any fire-plug shall be fixed," "provide and keep constantly laid on, unless prevented by frost, unusual drought, or other unavoidable accident, or during necessary repairs, a sufficient supply of water for the following purposes, that is to say—For cleansing the sewers and drains, for cleansing and watering the streets, and for supplying any public pumps, baths, and wash-houses."

Mr. Cripps contended there was nothing in any of the Acts above referred to which restricted the powers of the defendants with regard to the use of the hydrants; and he quoted the judgment of Lord Esher in *Moore v. Lambeth Water-Works Company*.

After further argument, their Lordships gave judgment.

Justice Bruce said he was clearly of opinion that the first of the questions they were asked to decide should be answered in the affirmative. The section of the Water-Works Clauses Act, 1847, and the other Acts referred to in the discussion, imposed certain obligations upon the Water Companies; but there was nothing in them limiting the powers of the Companies in respect to the use of their own water. As to the remaining questions, he thought 2 and 4 should be answered in the negative, and 3 in the affirmative.

Justice Phillimore concurred, and said various specific obligations were imposed upon the Water Companies; but the only inference that could be drawn from the provisions imposing these obligations, was that there were no other obligations imposed on them, the whole matter being created and regulated by statute. The plaintiffs contended that there was implied a further highly burdensome obligation upon the Companies—that they were not to be allowed to use the hydrants for any other purpose than that of extinguishing fires. He did not agree with that proposition. There was nothing in the case which suggested that any mischief would arise by reason of the use by the defendants of the hydrants for the purpose for which they had used them. The hydrants belonged to the Water Companies, subject to their user by others; and independently of the statutes the Companies would have control over them. Therefore, there being no restriction in the statutes with regard to defendants' right to use them, the plaintiffs' claim failed.

Judgment was accordingly entered for the defendants.

### Winding Up of the Mantleless Incandescent Gas Corporation, Limited.

In the Chancery Division of the High Court of Justice last Wednesday, Mr. Justice Wright made an order for the compulsory winding up of the above-named concern. The petitioner was represented by Mr. Dunham.

### An Action for Damages Dismissed.

In the list of the cases to come before Mr. Justice Day and a Special Jury in the Queen's Bench Division of the High Court of Justice last Thursday was that of *White v. The Gaslight and Coke Company*, which it was understood was an action to recover damages for personal injuries. When the case was called on, Mr. Vaughan Williams, who, with Mr. Danckwerts, Q.C., appeared for the defendants, said he believed no one was present on behalf of the plaintiff, and therefore he should ask that the action be dismissed with costs. The plaintiff was called, but did not answer. His Lordship thereupon acceded to the learned Counsel's request.

### Recovery of Money Alleged to have been Paid to a Water Company under Duress.

Last Wednesday, his Honour Judge Sir Horatio Lloyd gave judgment at the Wrexham County Court in an action brought by Mr. E. S. Clark, colliery proprietor, of Oak Alyn, Gwersyllt, against the Brymbo Water-Works Company, for the recovery of £25 18s. The action was to recover a sum of money alleged to have been paid to defendants as water-rate under legal duress, and in order to induce them to give plaintiff a supply of water for domestic purposes. The plaintiff objected to the amount of the Company's assessment, which resulted in the supply of water being cut off. His Honour said it was *primâ facie* necessary for plaintiff to show duress; but if payment was made with full knowledge of the facts, it could not be recovered. The money was paid with a full knowledge of the facts—that was clear from the correspondence. But plaintiff said that he paid under duress to induce defendants to give him a supply, as they were legally bound to do. He was at a loss to know how it could be said that the plaintiff was under legal duress in paying the money. Having first paid or tendered the proper rate, plaintiff would be in a position to demand a supply; but it seemed to him that the payment was made voluntarily. The plaintiff had a remedy in the provision of a penalty for refusing to supply. If the Company wrongfully exercised their powers, they were under penalties which went to the pocket of the injured party. On these grounds, he should give judgment for the defendants.

### The Defective Electric Lighting in Marylebone.

At the Marylebone Police Court last Friday, before Mr. Curtis Bennett, the Metropolitan Electric Supply Company, of Baker Street, were summoned by Mr. J. W. Godfrey, on behalf of the London County Council, for having, on various dates from October to December last, failed to supply electric energy to the premises of Sir Felix Semon, physician, of 39, Wimpole Street, Mr. H. T. Butlin, consulting surgeon, of 82, Harley Street, and Mr. A. A. Hudson, barrister, of 28, Weymouth Street. Mr. Daldy appeared for the prosecution; Mr. Muir for the defence. Mr. Daldy stated that the Council had received many complaints of the Company having failed in their contract to provide a continuous supply of electric energy for the use of their customers, and that the persons named in the summons were representative of the bulk. The Company, on a previous occasion (*ante*, p. 34) had pleaded as an excuse for their default that difficulties in connection with the construction of their new works at Willesden had occurred, over which they had no control. But he (Counsel) put it that the Company had undertaken new business which they were unable to execute except at the expense and inconvenience of their other customers, and to the benefit of the Company. This failing of the light had proved very serious, both in business and in private life. He maintained that the Company could have no answer to the complaints made, for they were compelled by statutory obligations to fulfil their contracts with their customers. Mr. Hudson and Mr. Butlin gave evidence of the supply of electricity being stopped for varying periods on different dates, on one or more occasions as long as six hours. Mr. Muir, for the defence, denied that the Company had extended their operations at the expense of their other customers. The failure had arisen from other causes. The learned Counsel then explained the nature of difficulties which had had to be overcome in connection with the erection of works at Willesden—difficulties which, he said, no amount of human foresight could anticipate, and which the Company had no power to prevent. Since the 15th of December the supply had been constant, and measures had been adopted whereby it would be impossible for failures to recur in the future. He called Mr. E. Cunliffe Owen, the Secretary, and Mr. Todd, the Chief Engineer of the Company, who bore out these statements. His Worship said it was clear the Company had done their best under very trying circumstances, but, nevertheless, they had not complied with the conditions under which they had obtained their very extensive powers from Parliament, and therefore they were liable to a penalty. They would be fined 10s., with 23s. costs on each of the six summonses; making a total of £9 18s.

**New Loan for the Birmingham Welsh Water Scheme.**—The Finance Committee of the Birmingham City Council report that they have been in negotiation with the Prudential Assurance Company for the advance of a loan to the Corporation for the purchase of land and the execution of works, the extension of mains, and other water-works purposes authorized by the Water Act of 1892. The Company have agreed to advance a loan of £500,000 on the following terms: The amount to be advanced in two instalments of £250,000 each, the first instalment to be paid forthwith, and the second instalment on or before April 7 next; the loans to bear interest at the rate of 3¼ per cent. per annum; the principal sums to be repayable to the Company in three years from the date of each respective advance; and to be secured on the revenue of the water undertaking and on the borough fund and rate.

# MISCELLANEOUS NEWS.

## REJECTION OF THE PROPOSED CONCILIATION BOARD BY THE GLASGOW TOWN COUNCIL.

At a Meeting of the Corporation of Glasgow on Thursday last—Lord Provost CHISHOLM presiding—the subject of the formation of a Conciliation Board was under discussion.

Mr. G. MITCHELL, in terms of notice, moved that a Committee be appointed to consider and report as to the best method to avoid disputes between the Corporation and their employees. He held that with a system of arbitration they would avoid any little friction which occasionally arose in the departments.

Mr. BATTERSBY seconded the motion. He believed the adoption of such a system as was proposed would prevent those old and destructive methods which had estranged workmen from employers and employers from workmen. A progressive Corporation like Glasgow should be ready at all times to engage in such progressive work. If such a system were adopted by the Corporation, it would have an enormous influence on industrial enterprise in the city and the country.

Mr. PATON said that, as the Convener of a department which had a big interest at stake, he thought the motion, instead of tending for peace, simply tended towards war. He therefore considered it his duty to move the previous question. The motion seemed extremely innocent; but it was by no means so innocent as it looked. His experience was that when a dispute arose between the department and their workmen, by far the best plan was to allow the department to deal with the workmen themselves. He thought the tendency of the Town Council in all departments had been kind, considerate, and conciliatory towards the workmen; and he believed the workmen were fairly well satisfied with their position. Only in extreme cases, when they were interfered with by outsiders, who came in for the purpose of meddling with things with which they had nothing to do, was a little agitation got up, and trouble caused. If he wanted any illustration of the wisdom of the course he suggested, he would simply refer to the last case they had before them. The fact was that the movement of the gas workers never had a shadow of life in it, because the men knew that the Corporation wanted to use them well; and the result was that, apart from outside agitation, they would have had no trouble. If the Corporation appointed a Committee of the kind asked, it would simply give an inlet to the agitator, and open the door for bringing in those who were not familiar with the matter under dispute.

Bailie R. ANDERSON seconded the amendment. In the trade with which he was connected, he had had considerable experience in negotiations with workmen both as to wages and to working conditions; and he had never yet had occasion to bring any outside influence to bear upon the subject. They were always able to settle the matter amicably.

Mr. FORSYTH supported the motion. He supposed that the trade with which Bailie Anderson was connected was prepared to recognize the Union; but Bailie Anderson, as a member of the Water Committee, was not prepared to recognize the Water Committee's men as members of a Union.

Bailie ANDERSON rose to order, and objected to Mr. Forsyth putting words into his mouth. He denied the right of Mr. Forsyth to make such a statement.

Mr. FORSYTH said he would just point to this fact—that the employees of the Water Committee became affiliated to the Gas-Workers' Unfon. That body sent a communication to the Water Committee; and Bailie Anderson was one of those who spoke against the recognition of the Gas Workers' Union. If this did not indicate that he was not prepared to recognize the Union among their own men, he did not know what it could be. Again, he considered an injustice had been done when they referred to the agitator. It was impossible for the men themselves to work out their own salvation individually, and so they formed a Union, and appointed a Secretary, who represented the men in all dealings with the employers. That Secretary was, therefore, known and characterized as an agitator. Men who had been earnest in their efforts to alleviate the miseries of the workers of the country had always been characterized as agitators. He was aware that the Corporation employees had a more steady tenure of employment than those outside generally had; but as far as perfection went, he did not think Bailie Anderson would claim anything like that for any of their men.

Mr. STEWART thought that the very simplicity of the motion should recommend it to the acceptance of the Corporation. Conciliation had been carried on for years in connection with almost every trade and industry. Lord Rosebery had sat on one Committee in England for three years; and some of the best brains in the country had tried to solve the labour question by means of conciliation. In consequence of the growth of the city and the increase in the number of persons employed by the Corporation, the time must come when a board of level-headed men would be required to discuss grievances which arose.

Mr. W. MARTIN said that an insuperable objection to the motion was that it interfered with the prerogative of the members of the Corporation. The members of the Corporation undertook a serious responsibility when they were elected; and if they appointed any board apart from themselves, they would be very justly held responsible by the citizens if anything went wrong. Since he was elected a member of the Corporation, he had had an opportunity of doing something in the way of conciliation in connection with the Parks Department. The members could not forget that they were there as representatives of the ratepayers, and that the employees of the Corporation were not engaged for the commercial purpose of enabling them to pay a dividend or make a profit on behalf of shareholders. They were there in the discharge of a public trust in which the interests of the ratepayers were concerned; and they could not allow any outside body to interfere between them and the ratepayers.

Bailie W. F. ANDERSON said he was as much opposed to disputes as anyone; but he had to ask Mr. Stewart and Mr. G. Mitchell this question: Did they consider that the recent representations made to the various Committees on behalf of the police, the scavengers, the gas workers, and so on, would have been better considered, and more justice done to these men, by the appointment of an outside board who knew nothing about the men's duties, or the responsibilities put upon the Council?

Mr. STEWART said he never proposed that an outside board should be appointed. What he wanted was a Committee of the Council.

Bailie ANDERSON remarked that Mr. Stewart was a democrat, and what he supposed he wanted was a selection of gentlemen from various Committees, who were to come in and interfere with any Committee who they thought were not competent or capable of doing their own duty. The fact that there were twenty applicants for every vacancy in the Corporation service was proof, if proof were needed, that it stood well with the public.

Mr. CRONIN said he had had twelve years' experience of Conciliation Boards, of which some of the largest and wealthiest employers in the West of Scotland were members; and there was not one of them who would not admit that their establishment was the best thing that ever happened in their business. If this was the case, he did not see why the Corporation employees should not have some medium of submitting any abuses that might exist. They did not propose that any agitator should be called in; they simply asked that a Board of Conciliation should be formed on the lines on which members of the Corporation had similar boards in connection with their own business. The members might reject the motion; but they would bring it forward again and again until it was carried.

Mr. W. STEVENSON said Mr. Cronin had held out a threat as to what would happen if the motion were not carried; yet he disdained being an agitator. They could have no better proof of what would happen under a Conciliation Board than their experience on the Gas Committee. They were told that if they did not pay off a certain employee because he did not belong to the Society, they would strike. They did strike on Sunday morning; and their places were filled in the afternoon.

On a division, the amendment was carried by 34 votes to 18.

### The Gas-Workers.

Ballie W. F. Anderson, who had a motion on the agenda to the effect that it be remitted to the Gas Committee to consider the propriety of forming a Conciliation Committee from their own workers, said it was unnecessary to propose the motion, as he understood that the workers had appointed a Committee to confer with Mr. Foulis.

## METROPOLIS GAS SUPPLY.

### Dr. A. W. Williamson's Quarterly Report.

The following is an extract from the report of Dr. A. W. Williamson, F.R.S., the Chief Gas Examiner for the Metropolis, on the quality of the gas supplied to London during the quarter ended the 31st ult.

The average illuminating power in standard sperm candles at each of the testing-places was as follows:—

| | |
|---|---|
| *The Gaslight and Coke Company—* | |
| Fenchurch Street, E.C. | 16·5 |
| Kinghorn Street, Cloth Fair | 16·4 |
| Dorset Buildings, Salisbury Square | 16·3 |
| Millbank Street, S.W. | 16·8 |
| Ladbroke Grove, W. | 16·5 |
| Vincent Terrace, Islington | 17·0 |
| Carlyle Square, S.W. | 16·3 |
| Camden Street, N.W. | 16 3 |
| Kingsland Road, N.E. | 16·7 |
| Spring Gardens, Charing Cross | 16·4 |
| Vinery Villas, St. John's Wood | 16·2 |
| Lambeth Road, S.E. | 16·3 |
| Hornsey Road, N. | 16·1 |
| George Street, Hampstead | 16·7 |
| *Commercial Gas Company—* | |
| Wellclose Square, E. | 16·7 |
| *South Metropolitan Gas Company—* | |
| Hill Street, Peckham | 16·7 |
| Stoney Lane, Tooley Street | 16·4 |
| Lewisham Road, S.E. | 16·4 |
| Blackfriars Road, S.E. | 16·3 |
| Burrage Road, S.E. | 16·4 |

It will be seen from these results that the average illuminating power of the gas at all the testing-stations was higher than the parliamentary standard—viz., 16 candles. Sulphuretted hydrogen was not reported to have been present in the gas at any of the stations during the quarter. The average quantity of sulphur in other forms than this was considerably less than that permitted—viz., 22 grains—at all the testing-places. Excesses of sulphur were reported by the Gas Examiners at Stoney Lane on the 23rd of October (24·4 grains), and at Blackfriars Road on the 12th of December (22·6 grains). With these exceptions, the limit allowed was not exceeded on any occasion. Ammonia was generally present in the gas throughout the quarter, but only in slight quantities. The limit allowed—viz., 4 grains—was not exceeded on any occasion.

## SERIOUS EXPLOSION AT THE WIENER NEUSTADT GAS-WORKS.

The London papers early last week contained a brief notice of an explosion which took place in the gas-works at Wiener Neustadt, a town of 25,000 inhabitants situated about 31 miles from Vienna, on the 14th inst. The works, which are in the hands of a private Company, were visited last Wednesday by Mr. F. Martin, Engineer of the Sonnwendgasse station of the Imperial Continental Gas Association in Vienna, who has sent us the following particulars of the accident: On Sunday, the 14th inst., at 8.45 p.m., a violent explosion took place in the purifying-house at the Wiener Neustadt Gas-Works. The lids of three of the purifiers were hurled off the boxes, and the house was completely wrecked, as well as the adjoining valve and meter room. The condensers standing at the back of the purifying-house were found to be blown out of their upright position, and leaning against the scrubbers. Some hundreds of the windows in the District Court House, situated about 80 yards distant,

were shattered by the concussion, which was succeeded by a fire among the ruins. This was promptly extinguished by the local Fire Brigade. Fortunately there was no loss of life, nor was anyone injured; and the destruction to plant will be at least partially covered by the insurance. Thanks to the prompt steps taken by the Chairman of the Board (Herr Inewein), who was ably assisted by Herr Stempkowski, of the firm of Franz Manoschek, the plant was so far repaired that, contrary to general expectation, on Tuesday evening the town was lighted almost as usual.* As to the circumstances immediately preceding the explosion, it is only necessary to state that the purifying-house and the adjoining valve and meter room were lighted from the outside by common lanterns, some of them having Welsbach, and the others ordinary burners. The man in charge left the valve-room to oil an engine and visit the gasholders, of which there are four, and then went on to another building. Before he had time to return to the valve-room, the explosion occurred. The inference to be drawn as to its cause is obvious.

## THE DEATHS FROM GAS SUFFOCATION NEAR TUNSTALL.

### Coroner's Investigation.

On Monday last week, Mr. John Booth, the County Coroner, held an inquiry at Sandyford, near Tunstall, on the bodies of Betsy Vernon (63), and Minnie Vernon (20), her daughter, who met with their deaths by gas suffocation, as briefly reported last week. It was stated that Mrs. Vernon was a widow, of independent means, and that she resided with her daughter, next door to a son-in-law, named William Colclough. Recently some repairs have been executed in the roadway in front of Mrs. Vernon's house; and a few days prior to the lamentable occurrence, a steam-roller was at work there. The weight of the machine is supposed to have injured the gas-mains, and so caused an escape of gas. On the evening of Friday, the 12th inst., a strong smell of gas pervaded the two houses adjoining that of Mrs. Vernon; and, upon investigation, it was found that gas was entering the rooms through the floors and the wainscoting on the walls. Owing to the volume of gas, it was impossible for the inmates of the houses to close their doors and windows during the night; and even then several people were overcome by the gas, and medical assistance had to be obtained in order to restore them. Colclough and his family were said to have suffered considerably from the effects of the gas; and during the night, when his family were ill, Colclough knocked upon the dividing-wall between his own house and that of Mrs. Vernon in order to attract her attention, but failed to do so. He then went outside and knocked at the door and front window, but without success, though he could see a light in the kitchen. He came to the conclusion that his mother-in-law had gone to visit a daughter at Longton. No further notice was taken of the occurrence until the Saturday night, when, nothing having been seen or heard of Mrs. Vernon or her daughter, Colclough effected an entrance into their house; and in the kitchen he found Mrs. Vernon lying on the floor dead, and her daughter, Minnie, on the sofa in a state of unconsciousness. Assistance was obtained, and efforts were made to restore Miss Vernon, but they proved unavailing. Other evidence was given, which showed that, during the week previous to the occurrence, the smell of gas had been noticed in the house; but no one thought there was any danger. The Jury returned a verdict that the deaths were due to asphyxiation caused by coal gas, evidently from a breakage in the gas-main. The Foreman added that the Jury regarded the matter as an accident, for which no one was to blame. [There are, according to the evidence, two peculiar features in this case. One is that there should have been a light in the kitchen and no explosion occurred; and the other that the residents should have allowed the gas to continue to accumulate in their houses without, apparently, calling attention to it.]

## A GAS WORKERS' PARADISE.

It may be remembered that in the course of the discussion which took place in the Manchester City Council on the 3rd inst. (*ante*, p. 90), one of the speakers referred to the insanitary condition of the Gaythorn station, which he said was not creditable to the Gas Committee. He added that he had seen other works which were models of their kind, and which might be imitated. The Chairman of the Committee (Alderman Gibson) admitted the justice of the observations, but said the Committee could not do for their men in Manchester what was done for those employed in the "model" works alluded to, which he presumed were those at Leicester. He offered some explanations as to why the men had not had more done for them, and said the matter was having his consideration. In view of this special reference to Leicester, it may not be uninteresting to reproduce from the "Sheffield Independent" an account by a correspondent of a visit he paid, in the company of a friend, to the gas-works in the Midland town. It is as follows.

Our first introduction was to what was described as "The Old Messroom." This is a comfortable upper room, in close proximity to the retort-house. Plain, homely tables of deal occupy the centre. At the side opposite the entrance, a bright fire was burning as we entered. This is flanked by the ovens in which the men's dinners and other meals are cooked. An attendant is appointed by the Gas Committee both to cook these and also to fulfil the other duties generally pertaining to the office of caretaker. Hot and cold water is provided for the necessary ablutions of hands and face. There was an air of comfort about the room. From this building we proceeded to "The New Messroom." This is a lofty hall some 78 feet by 24. Here again a cook-attendant is kept permanently in charge. Fifteen tables, flanked with forms, run longitudinally from one end to the other. It is fitted up with the usual cooking and other arrangements. In an adjoining room there are thirteen white enamelled hand-basins and five baths. Each man provides his own soap and towel. There is also a supply of pegs for clothing, and of lockers for other possessions.

We were next ushered into what was described as "The Lecture Hall." This is a room some 68 ft. by 30 ft. The floor is covered with linoleum. Polished tables are ranged on each side of the central passage. These are used for reading, games, &c. A circulating library of books is deposited on the shelves just above the tables. The tables themselves are provided with newspapers and magazines. The walls are covered with maps, framed prints, and pictures. The centre of the room is occupied by a bagatelle table. We were informed that this is shortly to be replaced by one for billiards. A raised platform stands at the further end, on which is placed a desk for lecturers and speakers. An upright piano gives evidence of singing and music. On the wall behind the platform, a magic-lantern sheet, 16 feet square, is rolled up; and in the centre of the hall there is the usual stand with lime-light attachments for the purposes of pictorial displays. As affording a measure of the interest taken by the men in the institution, it may be observed that the tables as well as other articles of furniture were made by the carpenters employed in the works. A review of the purposes to which the "Lecture Hall" is put almost inclines one to the opinion that it has been incorrectly named. It ought to be known as "The Gas Workers' Club." It is here that they meet nightly. They hold whist matches, play cards, chess, dominoes, and bagatelle. They bring their wives with them and have concerts and amateur theatricals. It may be well imagined that smoking is not prohibited. The only taboo placed by the Committee is on strong drink and language. The Committee of Management are appointed by the men from among themselves. The institute is for all practical purposes their own. The upkeep of it is provided by a voluntary weekly subscription of one penny. It has been found from actual experience that it is sufficient for the purposes of maintenance. The institutions of the Leicester Gas-Works are not exhausted by the club, dining-halls, lavatories, baths, and the other things which we have summarized. The gas workers have a brass band of their own. It is composed of thirty-four men, and is absolutely self-supporting. It is maintained by voluntary subscriptions, and the proceeds of public concerts. The character of the music discoursed by the band may be gleaned from the fact that its services are invoked at the concerts provided by the Municipality.

Another institution is the ambulance corps. The vast majority of the men employed in the works have joined this; but there is a special staff of thirty who are looked upon as the "crack team," if the phrase may be allowed in such a connection. As before indicated, the greater number of the men have passed the third examination in the principles of first aid. The teaching of ambulance duties has produced both a moral and financial result. It has given the men something definitely useful to learn during their spare hours, and has thus kept them out of the public-house. It has also enabled them to get their slight wounds dressed on the spot immediately after an accident, and has in this way saved the loss of time and wages which a visit to the Infirmary oftentimes induced. When the men were once outside the building, it was found that they did not return as speedily as was desirable. Meeting with boon companions, they remained to waste time away; and the journey to the Infirmary was frequently made the beginning of a drunken bout. All this is changed with the advent of the Ambulance Corps. Wounds are dressed on the spot; and now that they have had experience of the latter plan, they prefer it to that formerly in vogue. It is now a matter of some difficulty to induce them to attend the Infirmary, even for the treatment of accidents which the ambulance specialists think to be beyond their powers and skill. As Mr. Alfred Colson, the Manager of the works, expressed it on the occasion of our visit, "Ambulance work pays." The same may with equal degree be said of every one of the provisions made by the Leicester Corporation for the comfort, health, and happiness of their gas workers. For the last ten years, the Leicester citizens have benefited to the tune of from 6d. to 8d. in the pound from the profits of their gas-works.

## THE DEFECTIVE ELECTRIC LIGHTING IN MARYLEBONE.

### Deputation to the President of the Board of Trade.

Last Wednesday, the President of the Board of Trade (the Right Hon. C. T. Ritchie) received a deputation of residents in Marylebone on the subject of the defective supply of electricity in the parish by the Marylebone Electric Supply Company, to which reference has already been made in the "Journal." He was accompanied by Sir Courtenay Boyle, the Permanent Secretary, and Mr. A. P. Trotter, the Electrical Adviser to the Board. Two memorials were presented, representing 600 complainants.

Dr. Fletcher Little, in introducing the deputation, said that for several years past the supply of current had been very unequal, and occasionally it had failed altogether. For the past two or three months the failures had been of almost daily occurrence, and sometimes they had happened twice a day; the duration of the failure frequently extending over several hours. Sometimes the Company had given notice of their intention not to supply during several hours in the afternoon; but in the majority of cases the failure had taken place absolutely without notice. When the failures occurred, other light had, of course, to be hastily obtained. In many establishments, when the electric light fittings were put in the gas-fittings were removed, and the supply of gas was cut off. In those cases, lamps and candles had to be found and lit in the dark. The injury thus occasioned to all classes was manifest. There was a sudden cessation of work; and in some cases there was danger to life, especially in commercial establishments where large quantities of inflammable materials were displayed or stored. Representations had been made to the Company on the subject of these failures; but as they had not resulted in putting an end to the state of things complained of, the parties affected approached the President of the Board of Trade. They had to pay a high price for their electricity as compared with other parts of London. In Shoreditch, the price was only half that charged in Marylebone. Measures had been taken, by summoning the Company, to bring about a better state of affairs. The Vestry recently, under pressure, took out a summons for penalties for the Company's default, and the Magistrate adjourned the summons for three months. In a case of that kind, they were advised that it was hopeless for them to proceed by summons; for the penalties, if inflicted, would not compensate them for the damage they had sustained, but would go to the general public.

* It was stated in some of the London papers that, owing to the explosion, the town would have to remain without gas *for weeks!*—Ed. J.G.L.

The private consumers had no claim against the Company for any failure to supply them. They prayed the President to introduce, either in a Provisional Order or a Bill, a clause placing the Company in the same position as other trading companies, and giving the consumers a right to compensation for their breach of contract and duty to them. They would then be able to protect themselves.

Dr. E. A. Fardon, representing the Middlesex Hospital, said that during the past twelve months the authorities of the hospital had been put to very serious inconvenience by the deficiencies of the Company. The quality of the light supplied—the voltage—had been so low that when the lamps were turned on they gave hardly sufficient light even for necessary purposes. This entailed the turning on of an extravagant number of lamps. The effect upon the lamps of a fluctuating voltage such as they were accustomed to, was very destructive. Frequently during the latter weeks or months of the past year they had had the light entirely extinguished without the slightest warning. One might imagine what the effect of this was in a hospital where operations were very often carried on at all hours of the day. Their operating theatre, which relied upon the electric light for its illumination, had on more than one occasion been plunged into immediate darkness in the midst of very important operations.

Mr. Ritchie asked if there had been any amelioration of the situation since the 15th of December, and if they had had any reason to complain of total failure of light since that time.

Dr. Fardon said the 12th of December was the last time a failure occurred during an operation; but on the 20th and 23rd, as well as on the 4th of January, the hospital was plunged into darkness—once for 45 minutes.

Mr. T. W. Baker said that the fluctuations in the voltage had been frequently between 92 and 109 and 110 volts. The lights on the previous afternoon were so bad that at a place of worship gas had to be used.

Mr. J. Lewis, who was announced as the largest single ratepayer in Marylebone, said that on Dec. 6 his lights went out at 4.40 p.m., and remained out till 7.50 p.m.; on Dec. 7 they did so from 4.45 till 5.15; on Dec. 8 from 5.20 till 7.30; on Dec. 11, 12, 13, and 14, from 4 till 8; and on Dec. 15 from 3 till 4. Subsequently to the 15th of December, they had gone out only for 10 minutes or so at a time.

Mr. Ritchie said he thought the complaints had been so universally acknowledged and so clearly established that it was not really necessary to elaborate the subject or to trouble gentlemen to make speeches upon it. The names of the gentlemen who signed the requisition to himself and the composition of the Committee who had been formed were such as to make it quite apparent to everybody that the matter was one of very great importance, and one in which, if it was at all possible to find a remedy, a remedy should be found for the complaints. These were that the supply was often inadequate, and that sometimes it altogether failed. No one could have seen the correspondence in the Press without feeling that there must be some legitimate ground of complaint; and it was not only in the Press that those complaints had found utterance. He had had representations from various quarters—from public bodies and private persons, and had had individual experience himself, not in his own house, but in a friend's house, where he was dining one night. A hurried resort had to be made to candlesticks and lamps of all kinds, sorts, and descriptions; and he had heard of similar experiences from many personal friends. So that, having regard to all these facts, and to the deputation and to the memorials he had received, there could be no question at all that the complaint was a very substantial one, and well grounded. The Board of Trade had communicated with the Company more than once; and he had received a letter that morning from them in which they said there was no reason to apprehend any further failures. The Company stated that since the 15th of December there had been no ground of complaint. [Dr. Little: They state what is not correct.] He found, according to the statement of Dr. Fardon, that there was a total interruption on the 20th and 23rd of December, as well as on the 7th of January. Mr. Baker had said that so recently as the previous day the light was so unsatisfactory as to render it necessary that gas should be turned on in a chapel where the electric light was fitted. Complaints had also been made by Mr. Lewis of interruptions; but all the instances he adduced had been prior to the 15th of December. There had not only been complaint of the want of light, but also of its quality; and, so far as he could understand, this point was not by any means limited to the period ending with the 15th of December. It was alleged that even up to the present time the quality of the light was complained of. What the deputation had related had been also stated to him privately by a gentleman who had been a sufferer, and who said that, in place of having, as before, to use three or four lights, he now had to turn on seven, and that he got a light not so good as it was when he was using a much smaller number. Those complaints were very serious. According to the admission of the Company themselves, they certainly were greatly lacking in foresight, and much to blame, he thought, in not having seen what the development of their supply would be, and in not having properly provided in time for the demand that would be made upon them, because he understood that inefficient light was just as costly as efficient light. It seemed, therefore, to him that they had great reason to complain, not only because of the inadequacy of the light, but because they had to pay as much for the inadequate light as if they were given proper light. In a pamphlet the Company had sent to him, they had gone through the various periods during which they acknowledged that there was an inefficient supply; and they accounted for it by the large increase in the demand, and by the fact that their plant was not adequate to cope with the calls upon it. They were undoubtedly right when they said they took very strong and drastic steps to provide plant which should be equal to the demand; and they incurred very large expenditure on their Willesden works, which they said were completed on the 15th of December, since which date, they alleged, no real ground of complaint had been communicated to them. It would be his duty to inform the Company of the statements made there that day, and to point out that they differed from that made by them in their letter. There had not been any suggestion as to what the Board of Trade could do in the circumstances. Dr. Little had asked the Board to bring in a Bill or provide in a Provisional Order for damages for breach of contract; and he seemed to think that lighting companies were specially exempted, under the common law, for neglecting to fulfil their contracts. They were, however, just as liable as any other companies for any breach of contract between themselves and their customers. This suggestion, therefore, it was unnecessary for him to adopt. It was further said that the price charged was a very heavy one, and largely in excess of that paid in other parts of London. There was some remedy provided for excessive charges; and the Board of Trade, on application being made to them by the Local Authority, could review the charges and act accordingly. If they considered them to be in excess, they could provide for decreasing them; but in regard to the special complaints the deputation had brought there, he was afraid the Board of Trade had practically no power. The Board issued regulations, and they were binding upon the Company. They required them to maintain a constant supply. In case of default, the Company were liable to penalties, unless it were shown that default was caused by inevitable accident or by *force majeure*. So that any aggrieved person might take action. Action has been taken by summons; and the Magistrate allowed the penalties to hang over the heads of the Company for reasons stated in his decision. These penalties, he (Mr. Ritchie) presumed, would come up again; and though it was very little satisfaction to those who suffered that the Company should be fined, on the other hand it would have, he hoped, some effect upon them in inducing them to do their duty and provide adequately for the necessities of the case. He had said the Board of Trade had really no power to compel. The only power was that of summoning the Company before a Magistrate, and getting them mulcted in penalties. The only real remedy for defaults of this kind, with regard to quality, sufficiency, and price, was competition. Parliament had more than once endorsed the action of the Board of Trade in granting Provisional Orders both to local authorities and to districts already supplied by a company. The year before last, the Vestry of Marylebone applied to the Board for an Order to start an alternative supply. The policy of the Board was, where a *primâ facie* case was made out, to take such steps as would enable Parliament to come to a decision on the application that had been made. Accordingly, they granted an Order to the Vestry of Marylebone. This Order was read a second time, and was referred to a Committee. Unfortunately for the deputation, in that Committee the Order did not receive confirmation. He presumed the Committee considered that no *lâches* had been established on the part of the existing Company; and, this being so, it was not in the public interest that another Order should be given to the Vestry. No complaints were brought before the Committee, though some had been made in the House of Commons by those who spoke in favour of the second reading of the Bill. Since then they had had complaints of the inadequacy of the light supplied in the City of London. An inquiry had been held, the reasonableness of the complaints had been established, and a Provisional Order had been granted and confirmed by Parliament. There was at the present moment an application before the Board of Trade by a Company; but the Marylebone Vestry objected to the granting of the Order, on the ground that a Company were already in the field, and that a new one would break up the streets and increase the difficulties already experienced in finding places under the streets for necessary public works. Of course, the Board would have to consider the objections of the Vestry, and then deal with the question in the way they deemed best in regard to the public interest. He thought the deputation would have done some good in ventilating the subject, and in showing how burdensome the present state of things was, and how necessary it was that some remedy for it should be found. It would show the Company the gravity of the issue; and he hoped it would spur them on to make such alterations as would improve the quality of the supply, and also provide against the deficiencies which had been of such frequent occurrence, certainly previous to the 15th of December.

After some further conversation, the deputation thanked Mr. Ritchie for his reception, and withdrew.

## ELECTRIC LIGHTING NOTES.

Plans have been approved by the Keighley Town Council for buildings and plant in connection with their electric lighting scheme; the estimated cost being £12,510.

The Sevenoaks District Council have determined, on a report by Mr. W. C. C. Hawtayne, to apply for an Electric Lighting Provisional Order, and to oppose an application for an Order by the Electrical Power Distribution Company.

Mr. W. O. E. Meade King, of the Local Government Board, held an inquiry on Tuesday as to the application of the Worcester City Council for sanction to a loan of £4000 for electric main extensions, meters, and indicators. There was no opposition.

There was a long discussion at the meeting of the Limerick Corporation on the 11th inst. on the proposition to adopt Mr. Enright's report on the proposed scheme for supplying the city with electric light, and to ask for a Local Government Board inquiry with a view to borrowing the £20,000 required for the work. Eventually it was decided by 28 votes to 4 that the report be adopted and an inquiry asked for; a motion to limit the scheme to £10,000 having been defeated.

Asked, at the meeting of the Huddersfield Town Council last Wednesday, how it happened that, since the reduction in the price of electricity, consumers' bills had been heavier, Alderman Calvert, the Chairman of the Electric Lighting Committee, returned a somewhat ambiguous answer. He said that, since the reduction in the price of the light, the cost of coal had gone up considerably; and therefore the effect of the reduction could not yet be fully appreciated. We entirely fail to see what the price of coal has to do with the question put to the Alderman, if the reduced charges to the consumers are being continued.

A somewhat novel prosecution took place at Exeter a few days ago, when a youth was summoned for extinguishing a public lamp. At half-past two in the morning, the defendant opened the box at the base of one of the electric light posts, switched off the arc light, and turned on the incandescent side lights. The Town Clerk grimly remarked that if, in committing this piece of folly, he had touched an unguarded wire, the defendant would have been the subject of an inquiry by a jury in another Court. This information as to the danger of the practice, supplemented as it was by a fine of 10s., should be sufficient to restrain any tendency to practical joking of this kind on the part of the youth of Exeter.

The Douglas Town Council had a three hours' debate on Wednesday, the 10th inst., on the recommendation of a Special Committee that the

site at the foot of the quarry behind the gas-works should be acquired for electric lighting works. Strong opposition was shown to the proposal; some members favouring a site at Belle Vue, and others one at the Council's Ballaquayle Water-Works, which, it was claimed, would be central. The recommendation in favour of the quarry site was rejected by 12 votes to 10. The Committee were appointed to carry out the electric installation on the lines laid down by Professor Fleming, and they contended that their duties were ended by the negativing of their recommendation.

Just now Elland is much concerned about electric lighting and electric tramways; and the arrangements have almost reached a deadlock, owing to the Elland District Council and the Halifax Corporation being unable, so far, to come to terms. Some time ago the District Council decided to apply for a Provisional Order to enable them to supply electricity in the district. This step was taken after a private Company had sought to establish a local station. Recently the Halifax Corporation decided to extend their tramway service to Brighouse. To reach that borough, it will be necessary to go over practically the full length of the Wakefield main road, which is in the Elland district. Bearing in mind their Provisional Order, the District Council demanded power to supply the electric current for the trams when in their district. The Halifax Tramways Committee now refuse such a concession, but suggest that they should establish an electricity station at Elland, and supply current in bulk to the Local Authority at the rate of 2¾d. per unit.

"The Development of Electricity as an Illuminant" was the subject of a lecture given under the auspices of the Liberal and Conservative Associations of the Spinney Hill Ward at the Melbourne Hall, Leicester, last Thursday week, by Mr. Alfred Colson, Manager of the Corporation Gas and Electric Lighting Works; the proceeds being devoted to the fund for the families of Leicester reservists called out for active service. There was a large attendance. The lecturer first discoursed on the laws and attributes of electricity, showing the gradual growth of a science which, although its study had been practically confined to the nineteenth century, was known to exist some 2000 years ago. He then gave particulars relating to the discovery and early history of electricity and its development, as its adaptability for practical uses was discovered. As a practical illustration he referred to the electric lighting installation in Leicester, and showed by means of cartoons the machinery in use. During the evening, Kipling's "Absent-Minded Beggar" was recited; the collection amounting to £11 13s. Including this sum, it was anticipated the amount handed over to the fund would be about £30.

In our "Notes" last week, reference was made to the new danger to which users of the electric light are exposed by the bursting of the bulbs of incandescent lamps, and the glass flying into the eyes. The "Electrical Review," alluding to the matter, says: "The explanation seems to us to be afforded by the expulsion of the lamp 'socket,' or rather the cap. This points most distinctly to a short-circuit in the holder, which, at 200 volts, would act with explosive violence. Such a short-circuit sometimes occurs when the cap is being inserted into a live holder—indeed, we have quite lately heard of more than one case where a lamp has exploded in the act of insertion into a holder without first switching off. A cap properly fitted into a bayonet holder is not easily knocked out, nor is it likely to be short-circuited; but if it is carelessly inserted, it may be left in such a position as to provide the requisite conditions for a short, which would blow out the loosely-held cap, and by the shock fracture the bulb. The danger, therefore, lies in carelessness in putting the lamp in place, and neglecting to switch off before doing so. To suggest that the act of switching on a 200-volt lamp is likely to cause an explosion, is absurd."

Last Thursday afternoon, a meeting of users of electric light in New Cross and Deptford was held at the Goldsmiths' Institute, New Cross, under the presidency of Mr. Sidney Webb, to consider what steps should be taken to improve the supply of the illuminant. Mr. J. S Redmayne, Secretary of the Institute, stated that from tests taken there it was found that the voltage fluctuated between 100 and 75; and he believed the Board of Trade stipulated that companies must not supply at less than 4 volts below 100. There was also the great danger of the light going out suddenly when the students were busy with the machinery. Several gentlemen expressed their strong dissatisfaction at the way in which they were supplied. The Chairman said no doubt the cause of the inadequate and uncertain supply was the fact that business had increased so fast during the past year that it was altogether beyond the power of the Company to cope with it. But, notwithstanding this, they were going on booking customers. Vestries or district boards had power to take proceedings against any company for every default; and he suggested that they should be instituted by the Greenwich District Board. He also suggested that every customer should deduct 25 per cent. from his bill, and ask the Company to sue for it. A resolution was passed that the suggestions of Mr. Webb should be carried out.

Last Thursday, the Mayor of Stockport (Mr. Thomas Webb) formally opened the electricity works established by the Corporation on the site of the old Millgate Gas-Works; but current has now been supplied for some little time. The lamps installed are equivalent to 7700 of 8-candle power each, and 36 arc lamps for public lighting; the total plant capacity being equivalent to 13,000 8-candle power lamps, not including the accumulators or spare engine. The number of customers has increased from 30 on the opening day to 120; and the Committee controlling the department, of which the Mayor is Chairman, trust to be able to present at the close of the financial year a report showing that the undertaking has at least paid its way (a most unusual thing for the first year of electrical undertakings). Meanwhile the consumption of gas steadily and rapidly increases; and it is anticipated that the output for the current financial year will show a higher percentage of increase than has been met with throughout the history of the undertaking. In the year ending 1879, the make of gas was 232,204,800 cubic feet; and for the year ending March last, it was 609,965,500 cubic feet. The heaviest day's make of gas in 1879 was 1,284,600 cubic feet; and in the present winter it has reached 3,474,500 cubic feet. The heaviest day's consumption in 1879 was 1,433,300 cubic feet; and in the present winter 3,801,500 cubic feet.

The St. Helens Corporation are likely to find that their views on the Lancaster Electric Power Bill will be at variance with those of the other authorities concerned in this measure. The Lord Mayor of Manchester has convened a conference of representatives of Corporations for to-day to consider the Bill; and the St. Helens Parliamentary Committee have deputed a few of their number to attend. Their instructions are to support any action of the Association of Municipal Corporations, which has for its object the protecting of their rights and privileges in the matter of supplying electric light and power; but they are not to agree to any proposals which will have the effect of preventing the extension of cheap electrical power throughout the country. It is thought by the Committee that it would be a great advantage to have cheap power for the neighbourhood; and if it was found that the Company could in the future sell power cheaper than the Corporation, then the latter should have the right to ask them to supply them, if they wished it, in bulk, for the purpose of retailing it at a small profit to the inhabitants. It is considered that, if the Company get powers, and can supply more cheaply than the Corporation, manufactories will be established outside the town to use this cheap power. Therefore the Committee are of opinion that it would be far better, instead of opposing the Company, that the Corporation should have authority to buy from them; so that the manufacturers might be induced to go into the town instead of outside.

Since the Leeds Corporation purchased the business of the Yorkshire House-to-House Electricity Company, Limited, about a year ago, they have aimed at extending the works in such a way as to adequately meet the growing needs of the city. For the purpose of ascertaining the best means of at once improving the mode of supply and enlarging the means of production, the Electric Lighting Committee not long since instructed Messrs. Hopkinson and Talbot to draw up a report. The report, which has just been prepared, divides itself into three heads—finance, the provision of power in the area at present occupied by the Corporation mains, and the extension of electric current into other districts. On the question of finance, it has been decided to postpone a decision, in order to secure further expert advice. With regard to the provision of power in the area at present covered by the mains, it has been decided to recommend that the Corporation should not introduce any other system of current into that area, and that, seeing the great improvements that have been made in single-phase motors, the Corporation should provide motors of this type for hire, which, though suffering some disadvantages in comparison with motors on other systems, are capable of providing power for those who might want to use them. In reference to the question of the future extension of the works, it has been agreed to ask the Council to at once proceed to develop the Britannia Mills site, and provide plant and machinery for producing current on the two-phase system at 50 alternations, as suggested by Messrs. Hopkinson and Talbot. The Britannia Mills, which adjoin the electric lighting works, were taken over by the Corporation from the House-to-House Electricity Company at the time of purchase. The price, it is interesting to recall, was £217,420, paid in 5 per cent. irredeemable stock. What the cost of the extension now proposed may be, it is, of course impossible accurately to state; but it is roughly calculated at about £100,000.

Some correspondence has been going on in the "Bexhill Chronicle" on the subject of the electric lighting of the town. A writer under the not very euphonious name of "Tyke" was strong in the praise of the Brighton system of charging and in his advocacy of the electric light as the "poor man's" light. But he has been pretty conclusively answered by "A Visitor," who ventures to think that a prepayment gas-meter will answer the working man's purpose better than an electric lamp, as cooking as well as lighting could be done through the same agency. He points out that, on modern principles, it is quite possible for a gas-lighted house to be as healthy and clean as one electrically lighted—indeed, much more so under certain circumstances. "Tyke" ventured to make some comparisons between the cost of gas and that of electricity; putting 4½d. per unit as equivalent to gas at 2s. 8d. per 1000 cubic feet. "Visitor" puts him right on this matter. Gas has to be supplied of 15-candle power; and any consumer can obtain this quantity of light from his gas, if he burns it properly. The electric incandescent lamp equivalent to the 5 cubic feet of gas required for the production of the 15-candle light is the 16-candle power size, which may be taken as using 60 watts of current per hour. Now, 60 watts, at 4½d. per 1000 watts, cost 0·27d.; but 5 cubic feet of gas at 3s. 6d. per 1000 cost only 0·21d., or equal to 60 watts of electricity at 3½d. per unit. He clinches his argument by pointing out that, in order to compete with incandescent gaslight, electricity would have to be supplied in Bexhill at about 1d. per unit. The Local Authority have obtained the sanction of the Local Government Board to incur an initial expenditure of £20,000 on their electric light undertaking. With a knowledge of the local circumstances, "Visitor" expresses surprise that a consulting engineer could be found who would recommend such an outlay, and that the loan should have been granted. He thinks electric light works could have been established for a smaller sum, with more hope of early success.

## METROPOLIS WATER SUPPLY.

### The Future Control of the London Water Undertakings.

In the article on "Water and Sanitary Affairs" in the "JOURNAL" last week, it was mentioned that the Royal Commission on Water Supply, presided over by Lord Llandaff, would advise Her Majesty that the London Water Companies' undertakings should, if purchased, be handed over to a specially constituted Water Board. This statement is borne out by the final report of the Commission, issued yesterday. Pending the fuller notice of the document (which occupies 77 pages) which will appear in subsequent issues, we give the portion specially bearing upon this subject. It is as follows.

Having come to the conclusion that it is not desirable that the London County Council should be the purchaser of the water undertakings, we have now the more difficult task of reporting what authority or authorities should, if the policy of purchase is adopted at all, acquire and manage those undertakings. We put aside, at once, the notion that several authorities should become the purchasers. Whatever advantage, financial or administrative, can result from purchase, will arise from the amalgamation of the sources of supply and the means of distribution in one hand, so that both may be used and applied with the greatest economy, and with a view to the needs of every part of Water London. We have already commented at length on the impracticability of severance of the water undertakings even among the counties which are within Water

London, and have stated our view that, since severance is a necessary consequence of purchase by the London County Council, it forms a strong objection to purchase by that body.

In the Metropolitan counties, the feeling against purchase by any representative Water Board or Water Trust, constituted on the basis of population and rateable value, appears to be as strong as against purchase by the London County Council. The outside counties think they would, under such a Board or Trust, be as completely in the hands of London as if London were the sole purchaser. The representatives of those counties put their objection to purchase by a Water Trust on the ground that London would have the preponderance on such a Trust; and also on the ground that the Water Trust would have to levy rates in their county, and that any one county would be powerless to resist a resolution by the Trust to draw more largely upon the supplies of water in the county for the benefit of other parts of the water area, or to use the roads of one county rather than another for laying down pipes, or to give greater privileges to one county than to another.

It is, perhaps, unnecessary to give any better proof of the practical difficulty of creating any Water Trust, based on strictly representative principles, than is afforded by the history of the Government Bill of 1896. That Bill created a Water Board, on which the London County Council had barely as much preponderance as population and rateable value would have suggested; such Board to have powers of control, and also powers to promote Bills for the purchase of the water undertakings. The expenses of the Board were to be defrayed by the Metropolitan counties, in proportion to the total annual value, as determined for county rate purposes, of the parishes in each county within the Metropolitan water area which were wholly or partially supplied by any Metropolitan Water Company. The Government were obliged, however, under pressure from the Metropolitan counties, to insert in the Bill, in its progress through the House of Lords, a clause enabling any such county to take itself out of the Water Trust, and have independent control of its own water supply; and the Bill was ultimately dropped.

The conflicting opinions on the subject of purchase, which the Local Authorities of Greater and Water London and other witnesses have expressed to us in the course of our inquiry, and which we have already reviewed—and, indeed, the whole history of the question with which we are dealing—have made us fully aware of the great difficulty which exists in devising any Water Board, for the purpose of acquiring and managing the water undertakings, which will be accepted by the various interests concerned and by Parliament. Nevertheless, our consciousness of the great importance and intricacy of the questions relating to the future water supply of London which are before us, the immense scale on which the works will have to be constructed, and the financial arrangements made, the difficulty of obtaining, from eight different Companies, that unity of action which is so necessary for bringing such operations to a successful issue, and our recognition of the importance of bringing about, by purchase, absolute coalescence of the eight Water Companies and their interests, having led us to the conclusion that in such purchase and in management by a single public authority, a satisfactory solution of this great question may be found, it becomes our duty to put into concrete form, to the best of our ability, the suggestions we have to make.

We think the Water Board should be a permanent, and not a fluctuating body, consisting of not more than thirty members, selected on account of their business capacity, and, if possible, their knowledge of matters connected with water supply, and so constituted as not to give a preponderance to any of the conflicting interests concerned.

We think that the size and importance of the area to be dealt with takes the duties of the Water Board out of the category of purely municipal or local functions, and makes them a matter as much of national as of local concern. For this reason, we deem it necessary that the proceedings of the Board should be brought periodically and automatically under the observation of Parliament, and that it should include delegates of the Local Government Board, in order that the influence of the Executive Government should be continuously felt.

The London County Council should appoint (say) ten members of the Board; the Conservators of the River Thames, four members; the County Councils of Middlesex, Surrey, Essex, Hertford, and Kent, the Lea Conservancy Board, and the Common Council of the Borough of West Ham, should each appoint two members; and the Local Government Board should appoint the Chairman and Vice-Chairman. The appointing authorities should be empowered to fill any vacancy caused by death or resignation of their representatives, who should hold office for a definite term of years. The Chairman and Vice-Chairman should receive adequate salaries; and a sum should be allotted annually for division among the other members of the Board, according to their attendances, as is now done in the case of the Conservators of the River Thames. The Board should be empowered and required to acquire the undertakings of all the eight Metropolitan Companies, either by agreement or, failing agreement, by arbitration, on the terms usual in cases of compulsory purchase; taking over all the existing powers and obligations of the Companies. The boroughs of Croydon and Richmond appear to us to be reasonably entitled, if they desire it, to be made independent of the Board, and to supply themselves, taking over any works of distribution in their district belonging to the purchased Companies.

In order to meet the expenses of purchase, the Board should be entitled to issue a 3 per cent. stock secured on the water charges of the whole water area. This should be made a trustee investment, transferable at the Bank of England. The Chamberlain of the City of London should be directed to transfer to the Board all the proceeds in his hands of the Chamberlain's sinking-fund clauses, which should be repealed at and from the date of the purchase of the several undertakings. The price of purchase should be payable in cash at the option of either the vendors or the purchasers. By agreement, the vendors may be paid in the stock of the Board.

If Parliament thinks it necessary to apply to the Board the rule generally applied to municipal bodies who levy a loan on the security of the rates, and to require them to provide a sinking fund of their own, then the probability of a deficit, which we pointed out in an earlier part of this report, will arise. In that case it will be necessary, and in any case we think it will be prudent, to empower the Board to increase the water charges which the Companies are entitled to demand up to (say) the Lambeth level, if the interest on their stock cannot otherwise be paid. We think it would not be unreasonable to empower the Board, in case of a deficit in their income, to levy a rate-in-aid of a limited amount. A rate-in-aid, which in effect supplements the insufficiency of charges for domestic water supply, is unjust to those ratepayers who have at their own cost provided themselves with a water supply, and take nothing from the Companies. This is the case with breweries and other industrial establishments in London. But there are public purposes, such as extinguishing fires, watering streets and roads, flushing sewers, supplying public baths and washing-houses, which benefit all ratepayers, whether they are domestic consumers of water or not, and in consideration of which all ratepayers may be fairly called upon for some contribution, proportionate to the service rendered.

It may be that the Water Board will have occasion to look to the rates for further assistance, if, for instance, they have to incur considerable expenditure, not immediately remunerative, in order to make prudent provision for the future wants of the water area. This is the contingency which arouses the fears and excites the opposition of counties such as Middlesex and Kent. The only suggestion that occurs to us by which this opposition may be quieted is this: Assume that the Water Board has to borrow £10,000,000 at an annual charge (say) of £300,000 for interest. If this charge be distributed among the six counties concerned, in proportion to the number of supplies they are respectively taking from time to time, the contribution asked from each will be roughly proportioned to their own needs, and not to the needs of other counties. This contribution could be demanded by precept issued to the several County Authorities by the Water Board, and would be raised by them from the Local Authorities of the parishes which are within the area of Water London, and are wholly or partly supplied by the Board—either by means of an equal rate based on the county assessment, sufficient to cover the requisite contribution, in the same way as special rates are now raised by counties, or by rates levied in the several parishes in proportion to the number of supplies on account of which water-rents are received. Under this system, Hertfordshire, for instance, which takes very few supplies, would make a comparatively small contribution to any such expenditure. It is true that the difference of rateable values, in the different counties, would make some difference in the amount each individual ratepayer would have to contribute. If, for instance, two counties had the same quantity of supplies, and were, therefore, called upon for the same amount of contribution from an approximately equal number of ratepayers, but the average rateable value per house was higher in one county than in the other, then the householder in the low-rated county would have to pay more in the pound than the householder in the highly-rated county. Any attempt to adjust this difference would be attended with much difficulty. It is a question of policy, which it is not for us to determine, whether it will be best to enable the Water Board to meet deficiencies of revenue by such recourse to the rates, or wholly by increase of the water charges.

If the Water Board are required by Parliament to institute a sinking fund, we think it should not be done by the method of accumulation. The Water Board will have to deal with, and provide for, a debt so large that to accumulate and manage a sinking fund of that magnitude may be a matter of great difficulty. It would be better to provide that the debt should be extinguished by annual drawings. If these drawings were postponed (say) for twenty years from the date of the issue of the stock, the liability to redemption would affect its issue price and its value as a trustee stock but slightly, if at all. This method would, in our opinion, be preferable to a system of borrowing on terminable annuities.

In the event of the Water Board not having any power given to them to obtain money from the rates, it seems to be a fairly open question whether the principles on which Parliament has usually acted require that the Board should be subjected at all to the condition of providing a sinking fund or its equivalent, and whether they might not be left to redeem their debt by purchases in the market, when the condition of their revenue makes this course possible and expedient.

The Water Board should be required, by statute, to draw up an annual report of their proceedings and a statement of their accounts, in such form as may hereafter be determined. The latter should be duly audited by an independent auditor; and both should be included in the annual report of the Local Government Board which is now presented to Parliament.

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**The Second Victim of the Stoke Disaster.**—William Wheatley, one of the four men removed to the Infirmary suffering from serious injuries received in the accident at the Stoke Corporation Gas-Works on the 10th inst., died last Friday. He had sustained a terrible fracture of the skull, part of the brain being destroyed; and he died without having regained consciousness.

**St. Ives Corporation and the Water-Works.**—At a meeting of the St. Ives (Cornwall) Town Council a fortnight ago, the Mayor (Mr. E. Hain) reported that the water-works had been transferred from the Water Trustees, in whom they had formerly been vested, to the Corporation. It was decided to mortgage the undertaking to the bank to cover an overdraft of £4300, and to make a water-rate of 1s. in the pound. It was explained that the alteration of the assessment under which the rate is levied from the gross rental to the net rateable value would involve an increase of about 3d. in the pound. The Water Committee hoped, however, that with this rate they would be able to cover the whole expenditure, including the repayment of the year's instalment of the loan.

**Sale of Stock and Shares.**—At the Mart, Tokenhouse Yard, E.C., last Tuesday, Mr. Alfred Richards submitted to public competition, by order of the Directors, £5000 of ordinary stock of the Guildford Gas Company, ranking for a standard dividend of 5 per cent. per annum, subject to the sliding-scale. The bulk of the stock was placed at £112 per £100; a few lots fetching £112 5s. Some new ordinary stock of the New Swindon Gas Company, the last dividend on which was at the rate of 5 per cent., was sold for £119 10s. per £100 of stock. By instructions received from the Directors of the Southend Water-Works Company, Mr. Richards also offered a new issue of £10 shares in the Southend Water Company, ranking for a maximum dividend of 7 per cent., and the last dividend being at the rate of 5½ per cent. per annum. They were sold at the following prices: 90 at £13 15s., 250 at £13 17s. 6d., 250 at £14, and 10 at £14 2s. 6d. per share.

## NOTES FROM SCOTLAND.

**From Our Own Correspondent.**

*Saturday.*

For the present, so far as the Corporation of Glasgow are concerned, the suggestion to establish a Conciliation Board between the Corporation and their workpeople is scotched. On Thursday, the Corporation rejected the proposal by 34 votes to 18. There are 75 members, so that an absolute majority of the Town Council was not obtained; and the proposal may be made again, after six months. Besides, we have the assurance of one of the members that it would be brought forward until it was carried. But for these two circumstances, I would be disposed to say that the matter had been killed outright. My feeling is, however, that little more will be heard of conciliation until, probably, the eve of the next municipal election; and the Corporation may effect much before then, in thwarting outside influences. In this connection, it is observable that the Gas Committee of the Corporation are leading the way, in their Friendly Society proposals. So much is this the case that, when the motion for the appointment of a Conciliation Board for Corporation workers in all departments had been defeated, and it came to be the turn of Bailie W. F. Anderson to propose a remit to the Gas Committee to consider as to the appointment of a Conciliation Board for gas-workers, he said it was unnecessary to move it, because he understood that the workers had appointed a Committee of their own number to confer with Mr. Foulis. From this, it would appear that the agitators' occupation in Glasgow is gone, for the present at least. The wind has been taken out of their sails. Mr. Foulis has blanketed them with his Friendly Society. In the discussion upon the general proposal, the Gas Committee were not prominent. The rejection of the motion was moved by Mr. Paton, Convener of the Tramways Committee, and was seconded by Bailie R. Anderson, of the Water Committee. It was only as the discussion was closing that Mr. W. Stevenson, the Sub-Convener of the Gas Committee, gave his opinion upon it. Needless to say, he was adverse to the appointment of an outside Board. The experience of the Committee justified this. One of the chief supporters of the conciliation proposal was Mr. Cronin, who said he had had twelve years' experience of conciliation; and the largest manufacturers in the West of Scotland admitted that the establishment of Conciliation Boards was the best thing that had happened in their businesses. Mr. Cronin is a professional conciliator. Being so, I daresay he is also a professional municipal representative. They are a class who ought not to be encouraged. They are also a class who are very persistent in pressing their addresses upon the electors; and it is therefore the more necessary that no opportunity of endeavouring to repress them be allowed to pass. A Corporation of Cronins would be a close Corporation indeed, to all except those of their own class. It is well for the Corporation of Glasgow that they have not yet allowed the control of any of their Committees who are large employers to get into the hands of the professed friends of labour, because, if they had, there would not have been the solidarity which there was in resisting this week's proposal. That would have been a misfortune, because, apart from the merits of conciliation, the proposal here was unworkable, and would soon have led to confusion, or worse. Perhaps there was skill—cunning, it may be—in the framing of the recent labour movement; or perhaps it was only the outcome of circumstances. But we know that the Gas Workers' Union embraces the telephone workers; and it was stated in the Council on Thursday that the employees of the Water Committee had affiliated with the Gas-Workers' Union. A general Conciliation Board would have represented the gas workers, the water employees, the tramway workers, the lamplighters, the scavengers, and perhaps more. A dispute in any one department would, through the ubiquitous Gas-Workers' Union, have brought the workers in all the departments to exercise pressure upon the Conciliation Board. More than this, while the Corporation workers would have been obliged to accept the decisions of the Conciliation Board, the telephone workers, the general labourers, and the *omnium gatherum* of the Gas Workers' Union would not be under any obligation at all; and any member of the Conciliation Board who might have such members of the Gas Workers' Union in his employ, would be subject to pressure from them, with the alternative of having his private business dislocated. Conciliation Boards might not be so worked; but there is a possibility that they would, and the Corporation of Glasgow are wise not to run the risk of having to face such a situation.

A very concrete illustration of the ways of labour agitators is afforded by their action in connection with the carriage of coal to the Aberdeen Gas-Works. The work is being done by a steamship chartered by the Corporation, by which method a considerable saving is being effected. The coal is free on board, and is therefore loaded by the vendor. The Corporation have to take delivery in Aberdeen Harbour; and they have let the discharging of the vessel to a professional contractor. Those who say they have the interests of labour at heart are not satisfied with the rate of wages this contractor is paying; and they have approached the Corporation on the subject. It is this matter which is before the Gas Committee, and as to which complaint was made a week or two ago that they were taking too long time to settle it. Unable to find satisfaction at home, the agitators have endeavoured to have the loading of the vessel blocked at the port of shipment. A circumstantial account was put in circulation this week, to the effect that the National Union of Dock-Workers had effectually blocked the loading of the steamer at Bo'ness; that she had, in consequence, to be sent to Leith, where, the men being unaware of the position of affairs, loaded her; but that, if she returned to Leith, she would be blocked there also. Nothing could be more explicit; but the whole story is denied to-day. It is stated that someone arrived at Bo'ness and endeavoured to create an agitation there against the loading of the vessel, but was unsuccessful, as the vessel was loaded and despatched in the customary manner; that she was sent to Leith to take on a cargo which had been contracted to be shipped there; and that she would return to Bo'ness on her next voyage. I can only account for the story of the blocking of the vessel arising by assuming that an erroneous report had been sent on to Aberdeen as to what took place at Bo'ness—such a message, for instance, as would be calculated to give backbone to the movement in Aberdeen. What I want to call attention to, however, is that this is not a movement among the men who do the work at Aberdeen. The vessel has all along been discharged with great promptitude. The men employed by the contractor are willing to work, and do work. The Union are anxious to prevent them working; and when they could not induce them to

## GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

**Referred to on p. 196.**

| Issue. | Share. | When ex-Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|
| £ | | | p. c. | **GAS COMPANIES.** | | | £ s. d. |
| 590,000 | 10 | Oct. 13 | 10½ | Alliance & Dublin 10 p. c. | 20½–21½ | .. | 4 17 8 |
| 100,000 | 10 | ,, | 7½ | Do. 7 p. c. | 14½–15½ | .. | 4 16 9 |
| 800,000 | 100 | Jan. 2 | 5 | Australian 5 p. c. Deb. | 100–102 | .. | 4 18 0 |
| 200,000 | 5 | Nov. 15 | 6 | Bombay, Ltd. | 5¾–6¼ | .. | 4 8 11 |
| 40,000 | 5 | ,, | 6 | Do. New, £4 paid | 4–4½ | .. | 5 6 8 |
| 880,000 | Stk. | Aug. 16 | 12 | Brentford Consolidated | 275–280 | +2 | 4 5 9 |
| 270,000 | ,, | ,, | 9 | Do. New | 210–215 | .. | 4 3 9 |
| 50,000 | ,, | ,, | 5 | Do. 5 p. c. Pref. | 140–145 | .. | 3 9 0 |
| 159,375 | ,, | Dec. 14 | 4 | Do. 4 p. c. Deb. | 124–128 | .. | 3 2 6 |
| 220,000 | Stk. | Sept. 15 | 11½ | Brighton & Hove Orig. | 250–260 | .. | 4 8 6 |
| 226,320 | ,, | ,, | 8½ | Do. A. Ord. Stk. | 183–188 | .. | 4 10 5 |
| 973,500 | Stk. | Aug. 16 | 5 | Bristol, 5 p. c. max. | 125–130 | .. | 3 16 11 |
| 420,000 | 20 | Sept. 29 | 10 | British | 43¾–44¼ | .. | 4 9 10 |
| 50,000 | 10 | Aug. 31 | 12 | Bromley, Ord. 10 p. c. | 25–27 | .. | 4 8 11 |
| 75,000 | 10 | ,, | 9 | Do. 7 p. c. | 19–21 | .. | 4 5 8 |
| 500,000 | 10 | Oct. 13 | 6 | Buenos Ayres (New) Ltd. | 9¾–10¼ | +¾ | 5 17 1 |
| 220,000 | Stk. | Dec. 29 | 4 | Do. 4 p. c. Deb. | 98–100 | .. | 4 0 0 |
| 150,000 | 20 | July 13 | 8½ | Cagliari, Ltd. | 28–29 | .. | 5 13 10 |
| 100,000 | 10 | Sept. 29 | 8 | Cape Town & Dis., Ltd. | 13½–14½ | .. | 5 10 4 |
| 50,000 | 50 | Nov. 2 | 6 | Do. 6 p. c. 1st Mort. | 56–58 | .. | 5 3 5 |
| 550,000 | Stk. | Oct 13 | 13½ | Commercial Old Stock | 305–310 | .. | 4 7 1 |
| 200,750 | ,, | ,, | 10½ | Do. New do. | 240–245 | .. | 4 5 9 |
| 200,750 | ,, | Dec. 14 | 4½ | Do. 4½ p. c. Deb. | 140–145 | .. | 3 2 1 |
| 800,000 | Stk. | Dec. 14 | 9 | Continental Union, Ltd. | 177–181 | .. | 4 19 5 |
| 200,000 | ,, | ,, | 7 | Do. 7 p. c. Pref. | 178–183 | .. | 3 16 6 |
| 51,600 | Stk | Aug. 31 | 14 | Croydon A 10 p. c. | 335–340 | .. | 4 2 4 |
| 168,400 | ,, | ,, | 11 | Do. B 7 p. c. | 265–270 | .. | 4 1 5 |
| 555,000 | Stk. | Aug. 16 | 5½ | Crystal Palace Ord. 5 p. c. | 128–133 | −2 | 3 18 11 |
| 60,000 | ,, | ,, | 5 | Do. 5 p. c. Pref. | 140–145 | .. | 3 9 0 |
| 486,090 | 10 | July 28 | 11 | European, Ltd. | 21–22 | .. | 5 0 0 |
| 354,060 | 10 | ,, | 11 | Do. £7 10s. paid | 15½–16½ | .. | 5 0 0 |
| 14,993,075 | Stk. | Aug. 16 | 4% | Gas-light and Coke | 4 p. c. Ord. | 106–109 | +2½ | 4 9 11 |
| 2,600,000 | ,, | ,, | 3½ | | 3½ p. c. max. | 97–99 | .. | 3 10 8 |
| 3,799,735 | ,, | ,, | 4 | | 4 p. c. Con. Pref. | 119–122 | .. | 3 5 7 |
| 3,993,975 | ,, | Dec. 14 | 3 | | 3 p. c. Con. Deb. | 96–98 | .. | 3 1 3 |
| 70,000 | 10 | Nov. 15 | 8 | Hongkong & China, Ltd. | 13½–14½ | .. | 5 10 4 |
| 3,800,000 | Stk. | Nov. 15 | 10 | Imperial Continental | 212–217 | +2 | 4 12 2 |
| 473,600 | Stk. | Aug. 16 | 3½ | Do. 3½ p. c. Deb. Red. | 101–104 | .. | 3 7 4 |
| 75,000 | 5 | Dec. 14 | 6 | Malta & Medn., Ltd. | 5–5½ | .. | 5 9 1 |
| 560,000 | 100 | Oct. 2 | 5 | Met. of Melbourne | 5 p. c. Deb. | 110–114 | .. | 4 7 9 |
| 250,000 | 100 | ,, | 4½ | | 4½ p. c. Deb. | 107–109 | .. | 4 2 7 |
| 541,920 | 20 | Nov. 15 | 3 | Monte Video, Ltd. | 11–12 | .. | 5 0 0 |
| 617,946 | Stk. | Aug. 31 | 9¼ | Newc'tle & Gatesh'd Con. | 220–225 | .. | 4 2 3 |
| 264,855 | Stk. | Dec. 29 | 3½ | Do. 3½ p. c. Deb. | 104–107 | .. | 3 5 5 |
| 60,000 | 5 | Sept. 29 | 7 | Ottoman, Ltd. | 5¼–5¾ | .. | 6 1 9 |

| Issue. | Share. | When ex-Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|
| £ | | | p. c. | **GAS COMPANIES.** | | | £ s. d. |
| 150,000 | 5 | Nov. 30 | 8 | Oriental, Ltd. | 7–7½ | .. | 5 6 8 |
| 135,000 | 5 | ,, | 8 | Do. New, £4 10s. pd. | 6½–6¾ | .. | 5 6 8 |
| 15,000 | 5 | ,, | 8 | Do. do. 1879, £1 pd. | 1½–1¾ | .. | 4 11 5 |
| 500,000 | 100 | Dec. 1 | 6 | People's Gas of Chicago 2nd Mtg. Bonds | 102–106 | .. | 5 13 2 |
| 851,070 | 10 | Oct. 13 | 7 | River Plate Ord. | 10¾–11¼ | .. | 6 4 5 |
| 250,000 | Stk. | Dec. 29 | 4 | Do. 4 p. c. Deb. | 98–100 | .. | 4 0 0 |
| 250,000 | 10 | Sept. 15 | 10 | San Paulo, Ltd. | 12–13 | .. | 7 13 10 |
| 135,000 | Stk. | Sept. 15 | 10 | Sheffield A. | 249–251 | .. | 3 19 8 |
| 209,053 | ,, | ,, | 10 | Do. B. | 249–251 | .. | 3 19 8 |
| 447,427 | ,, | ,, | 10 | Do. C. | 249–251 | .. | 3 19 8 |
| 5,600,000 | Stk. | Aug. 16 | 5½ | South Metrop., 4 p. c. Crd. | 133–136 | .. | 3 18 5 |
| 1,520,000 | ,, | Jan. 12 | 3 | Do. 3 p. c. Deb. | 100–102* | .. | 2 18 10 |
| 120,000 | Stk. | Aug. 31 | 6 | Tottenham and Edmonton A. 5 p.c. B. 3½ p.c. 4 p. c. Deb. | 141–143 | .. | 4 3 11 |
| 250,520 | ,, | ,, | 4½ | | 102–104 | .. | 4 6 6 |
| 55,100 | ,, | Dec. 14 | 4 | | 113–117 | .. | 3 8 5 |
| 182,380 | 10 | Jan. 12 | 5 | Tuscan, Ltd. | 9–10* | .. | 5 0 0 |
| 149,900 | 10 | Jan. 2 | 5 | Do. 5 p. c. Deb. Red. | 101–104 | .. | 4 16 2 |
| | | | | **WATER COMPANIES.** | | | |
| 780,399 | Stk. | Dec. 29 | 11 | Chelsea, Ord. | 307–312 | .. | 3 10 6 |
| 150,000 | ,, | ,, | 5 | Do. 5 p. c. Pref. | 157–162 | .. | 3 1 9 |
| 160,000 | ,, | ,, | 4½ | Do. 4½ p. c. Pref. '75 | 145–150 | .. | 3 0 0 |
| 175,785 | ,, | Sept. 29 | 4½ | Do. 4½ p. c. Deb. | 148–153 | .. | 2 18 10 |
| 1,720,560 | Stk. | Oct. 13 | 7 | East London, Ord. | 200–205 | .. | 3 8 4 |
| 654,740 | ,, | Dec. 29 | 4½ | Do. 4½ p. c. Deb. | 145–150 | .. | 3 0 0 |
| 890,000 | ,, | ,, | 3 | Do. 3 p. c. Deb. | 98–100 | .. | 3 0 0 |
| 700,000 | 50 | Dec. 14 | 7½ | Grand Junction 10 p. c. max. 4 p. c. Deb. | 107–109 | .. | 3 8 10 |
| 310,000 | Stk. | Sept. 29 | 4 | | 131–136 | .. | 2 18 10 |
| 708,000 | Stk. | Aug. 16 | 14 | Kent | 348–353 | .. | 3 19 4 |
| 160,000 | ,, | ,, | 7 | Do. New, 7 p. c. max. | 200–210 | .. | 3 6 8 |
| 1,043,800 | 100 | Dec. 29 | 10½ | Lambeth, 10 p. c. max. | 292–297 | .. | 3 10 8 |
| 406,200 | 100 | ,, | 8 | Do. 7½ p. c. max. | 215–220 | .. | 3 12 9 |
| 350,000 | Stk. | Sept. 29 | 4 | Do. 4 p. c. Deb. | 135–138 | .. | 2 18 0 |
| 500,000 | 100 | Aug. 16 | 13½ | New River, New Shares | 425–430 | .. | 3 2 9 |
| 1,000,000 | Stk. | July 28 | 4 | Do. 4 p. c. Deb. | 133–138 | .. | 2 18 0 |
| 902,300 | Stk. | Dec. 14 | 7½ | South-wark and Vauxhall Ord. 7½ p. c. max. 5 p. c. Pref. 4 p. c. A Deb. | 202–207 | .. | 3 12 6 |
| 126,500 | 100 | ,, | 7½ | | 190–195 | .. | 3 16 11 |
| 489,200 | Stk. | ,, | 5 | | 160–165 | .. | 3 0 7 |
| 1,019,585 | ,, | Oct. 13 | 4 | | 131–136 | .. | 2 18 10 |
| 1,155,066 | Stk. | Dec. 14 | 10 | West Middlesex | 288–293 | .. | 3 8 3 |
| 200,000 | ,, | ,, | 4½ | Do. 4½ p. c. Deb. | 147–152 | .. | 2 19 3 |
| 200,000 | ,, | Sept. 15 | 8 | Do. 8 p. c. Deb. | 100–102 | .. | 2 18 10 |

*Ex div.

stop, their next endeavour was, by getting other men to deprive themselves of wages, to ensure that there would be no unloading to do. They have, fortunately, been foiled in the meantime; but there is no guarantee that, nothing daunted, they will not before very long return to the attack.

At the Dumfries Gas Commission this month, Bailie Currie, the Convener of the Gas Committee, stated that consideration is to be given to the terms of their policy of insurance under the Workmen's Compensation Act. Power has been given to renew it on the most favourable terms obtainable. Bailie Currie, however, stated that some Corporations were not renewing their policies, as they considered that they did not come under the Act. They do well to renew their policy. On this subject, I would like to refer all who are interested to a decison in the Court of Session this week, in which it was laid down that a man in charge of a water-cart, employed in the repair of a road in Berwickshire, was engaged in an engineering work, and came within the scope of the Act; the conclusive condition which made him so being that a road-roller, which was under steam, was also employed in the work. The accident happened in the afternoon, at which time the roller had gone off to work at some distance, at a job for which water was not required; but the injured man was brought under the protection of the Act by the fact that during the dinner hour the engine and the water-cart stood beside each other at the side of the road. This is the widest decision I have seen as to the scope of the Act; and, of course, it makes it clear that if there is any sort of power machinery in a gas-works, the works—at least in Scotland—are engineering works, and are under the Act. The decision would seem to leave no ground of escape from the conclusion that a mainlayer, if he went out from the gas-works in the morning to his work, would be also under the Act.

At the meeting of the Dumfries Commission, one of the members complained that the gas they were being supplied with was the worst in any town in Scotland. The absurdity of this ill-favoured remark is apparent when it is considered that the speaker could not be aware of the quality of the gas supplied in every town in Scotland. If the gas has not been quite up to the usual standard of late, there is the explanation which had just been given—that the output during December was the largest which had ever been sent out in one month. It was over 12 million cubic feet, and was so large that the Manager (Mr. G. Malam) had had great difficulty in keeping up the supply. There was also the fact that it was almost impossible to get coal delivered, and that, in addition, the price of coal had been raised to them by 3s. 6d. per ton. The complaint, further, was made in the afternoon, just when the gas was lighted, and when the pressure, as was pointed out, was not fully on. But he was taken seriously; for on the same evening the representative of a local newspaper, accompanied by Mr. J. S. Thomson, the Sub-Convener of the Gas Committee, paid a visit to the gas-works, saw the gas tested for illuminating power, and published a half-column of information about the works. From this, I ascertain that the Commission aim at supplying gas of not less than 26-candle power; but that on the night of the visit, it was 29·80 candles, and had been as high as 30·07 candles. The average during November had been 26·91 candles; and during December, 27·13 candles. The standard prescribed is 14 candles. Coal and oil (the Peebles process) are used; and the yield per ton of coal is 10,300 cubic feet, or 250 cubic feet above Mr. Malam's estimate. Now, whatever grumbles may be made, I think that every impartial person must be convinced that in Dumfries the gas undertaking is in a most prosperous and satisfactory position.

Mr. S. Stewart, the Engineer to the Greenock Gas Trust, reported to the Trust this week that, owing to the dark days in December, there was very considerable difficulty in meeting the demand for gas. It was therefore of the utmost importance that arrangements should be made this year to meet an increased production. Mr. T. Mitchell, the Convener of the Gas Committee, said that the demand during the past two years had been quite phenomenal. The increase in that time had been nearly 40 million cubic feet, which was more than the increase in any previous four years. In the last nineteen years, the quantity of gas made had nearly doubled. Since the price of gas was reduced two years ago, the number of new consumers had been 1000. The matter was remitted to a Committee.

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Mr. Thomas O'Neill, Manager of the Dunbar Gas-Works, writes to correct an error in the paragraph in last week's "Notes" referring to a meeting of his Council. He says that Bailie Smith is still Convener of the Gas Commissioners, and has been so for many years; and he also points out that the questions which Bailie Smith ineffectually tried to bring before the notice of the Council were not of "minor," but of very material importance—entailing, as they did, proposed alterations in the works, &c.

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**Crowborough District Water Company.**—An extraordinary general meeting of this Company was held last Wednesday, for the purpose of authorizing the issue of further capital. The Chairman (Mr. S. R. Dennis) proposed a series of resolutions to empower the issue of 500 £10 preference shares and 500 £10 new ordinary shares. He said the Directors, after going fully into the affairs of the Company and the prospects of the extensions, had decided to recommend that the present issue should be £10,000. Mr. Langridge seconded the motion. Mr. W. A. Hounsom proposed, as an amendment, that 500 new ordinary shares of £10 each be created, provided that no steps be taken until 28 clear days after the next half-yearly meeting. The speaker at some length severely criticized the manner in which the Company had been conducted, and alleged, among other things, that at the half-yearly meeting on Feb. 14 last it transpired that the Directors had illegally voted themselves fees amounting to £150. He did not say that he was going to quarrel with the Directors being thoroughly well paid for the work they did; but he did say it was entirely wrong that they should take such an action. He objected to any preference stock being created; the £5000 being ample. Mr. Preston seconded the amendment, which was ultimately unanimously adopted.


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## CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Jan.* 20.

**Sulphate of Ammonia.**—The activity at the close of last week has disappeared. But the market has been fairly steady; and the quotations remain at £11 10s. to £11 12s. 6d. per ton, f.o.b. at the ports. Production continues to be disposed of as it becomes available. In the forward position, £11 15s. per ton, ordinary terms, f.o.b. Leith, has again been paid for January June shipment; and that is the closing value. For January-March, Beckton terms, £11 12s. 6d. per ton is quoted.

**Nitrate of Soda** tends to harden for cargoes due and near at hand; and on spot the quotation for fine quality is 8s. per cwt., *ex*-quay.

LONDON, *Jan.* 20.

**Tar Products.**—Benzols are weaker; 90 per cent. being almost unsaleable. Some confusion exists in respect to quotations for benzol. The quotation made here, with the other products, is for wholesale quantities and for ordinary purposes. For small quantities, and especially for a quality specially prepared for enriching gas, somewhat higher prices are being obtained, depending very much, however, upon the position. Lower prices are being offered for carbolic acid, as the proclamation against its export has entirely stopped its shipment. The demand, however, in Great Britain continues good; and it is possible that, when the first excitement is over, carbolic may again see the higher price it attained last week. The other liquid products are in moderate request; while pitch is quoted a little dearer.

Average quotations during the week are: Tar, 17s. to 25s. 6d. Pitch, east coast, 34s. 6d.; west coast, 32s. 6d. Benzol, 90's, 7d.; 50's, 10d. Toluol, 90 per cent., 1s. 2d.; pure, 2s. Solvent naphtha, 1s. 4d. Crude, 30 per cent., naphtha, 4⅜d. Heavy naphtha, 1s. 2½d. Creosote, 3¼d. Heavy oils, 3¾d. Carbolic acid, 50's, 2s. 8d.; 60's, 3s. Crude naphthalene, 50s. to 55s. Anthracene, nominal, "A," 4d.; "B," 2½d.

**Sulphate of Ammonia.**—There has been a steady and improving inquiry during the past week; and the advanced prices are well maintained. The value at all ports is about £11 10s. to £11 12s. 6d. per ton, less 3½ per cent.

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The Ashton, Stalybridge, and Dukinfield Joint Water Committee are appealing to consumers to exercise care in the use of water, as there is only half the quantity in the reservoirs that there was this period last year.

It was reported at a meeting of the Wigan Corporation Gas Committee last Wednesday that one of the employees of the department (Private Archibald Coates) was about to leave for service with the South Lancashire Hussars. It was resolved that his wife should be allowed the sum of 12s. per week, together with 2s. per week for each child. The Gas Workshops Committee of the Leeds Corporation have decided to pay to the sister of Mr. A. M. Thompson (Assistant Superintendent of the Meter Department in Meadow Lane), who has volunteered with the Yeomanry, half the amount of his weekly wages.

## COAL TRADE REPORTS.

**From Our Own Correspondents.**

**Lancashire Coal Trade.**—The continued scarcity of supplies of all descriptions of fuel, except some of the best qualities of round coal, and the exceptional pressure of requirements all round for general manufacturing purposes, coupled with the further increase in the wages of the miners, have brought about the inevitable advance in prices. To this reference was made last week as being more than probable; and it is now evident that this further upward move has only been held back pending the final settlement of the arrangements for a continuance of the Conciliation Board. In fact, in the West Lancashire district the advance was decided on at a private meeting last Friday week; but the issue of circulars was held in abeyance until after the meeting of the Conciliation Board in London on Tuesday last, when the final agreement between the Miners' Federation and the Coalowners' Association was come to. On the day of the issue of circulars by the West Lancashire collieries, the Manchester coalowners also decided to make a general advance in prices; but some irregularity in the market is likely to be caused from the fact that, while in West Lancashire prices have been advanced 1s. 3d. per ton on best Wigan Arley, and 1s. 8d. on other descriptions of fuel, the advance in the Manchester and Salford district is limited to 10d. per ton on all sorts, although the leading Manchester colliery firms intimate that in outside districts, where the full West Lancashire advance has been put in force, they will also increase their prices to a similar extent, ranging according to circumstances from 1s. 3d. to 1s. 8d. per ton. This advance will bring the average pit prices to 14s. 6d. and 15s. per ton for the best round coals, 13s. to 14s. for medium qualities, 12s. to 12s. 6d. for common sorts, 9s. 6d. to 10s. for medium slack, and 10s. 6d. to 11s. for best qualities. It is as yet too early to form any definite opinion as to the effect of this advance on the market. At present, it can only be stated that collieries are all short of supplies; and for the moment it is less a question of prices than of consumers obtaining sufficient quantities to keep their works going, which in many cases they are barely able to do. The restriction of the output is likely to become an important factor in the immediate future. Since the last advance in wages, it is estimated that generally throughout Lancashire the output of the pits has been quite 10 per cent. below the average "get;" and with the further increase of 5 per cent. in wages now conceded, the general opinion is that there will be a corresponding reduction of the output, which must necessarily tend to increase the difficulties—already quite serious enough—with regard to adequate supplies for iron making and general manufacturing purposes. The demand for shipment has also been much above the average; and with special prices obtainable—15s. per ton being about an average figure for ordinary steam coal delivered at the ports on the Mersey—there is a strong inducement for collieries to withdraw coal from the inland trade, as they can obtain better prices at the ports than from home customers. With regard to gas coals, there is not much doing outside contracts, to afford any reliable basis as to the effect the advance in prices may have upon this branch. Where, however, any quantities beyond

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contract deliveries are required, with the present shortness of supplies, special prices, as reported last week, have to be paid—ranging in some cases from 14s. to 15s. per ton at the pit. These, of course, are simply temporary prices governed by the present exceptional conditions; but when existing contracts have to be renewed, it is tolerably certain that collieries will demand an advance of not less than 2s. 6d. to 3s. per ton over last year's prices. As to coke, in one instance in the Manchester district prices have been advanced 10d. per ton, following the upward movement in coal; but so far there has been no general alteration in list rates. Lancashire Coke Makers' Association prices remain unchanged; and at the ovens ordinary furnace cokes average 23s. to 23s. 6d., and foundry sorts 30s. per ton.

**Northern Coal Trade.**—There is a strong demand for coal all round, though prices are slightly easing off from the high rates brought about by the scarcity after the holidays. Best Northumbrian steam coals are now 19s. 6d. per ton f.o.b., and steam smalls are 11s. 6d. per ton; and even higher prices than these have had to be paid to ensure supplies in the last few days. Gas coals are still scarce; for though the consumption is now rather less than it was, there is a good deal of leeway to be made up, and contracts that are behindhand in delivery will take a very large proportion of the output for some time. Prices for quantities beyond these contracts are high, but are rather difficult to define exactly; about 18s. 6d. per ton f.o.b. being the nearest approach to a medium price that can now be given under the circumstances. There is little alteration in the gas coke trade; and prices are still irregular, according to the scarcity of the supply at a given period. About 15s. 6d. to 16s. 6d. per ton is the f.o.b. rate now generally quoted for export. A contract for gas coal for Copenhagen, to the extent of about 80,000 tons, is believed to have been given to four Durham collieries, at about 15s. per ton f.o.b.—a very great advance on the prices of last year.

**Scotch Coal Trade.**—At present, the coal trade is in such a dislocated condition that it can scarcely be described. It has been agreed, by the Conciliation Board, to give the miners an increase of 9d. per day in wages; and although the calculation has been made public that the rise in wages will only add about 3½d. to the cost of a ton of coal, coalmasters have, in more places than one, been meeting and agreeing to raise the price by 2s. per ton. It is reported that forward demands are strong, and that current rates are being obtained; but the periods are not mentioned, and the report is doubtful. By most people current rates are regarded as only temporary. They are: Main, 14s. per ton f.o.b. Glasgow, ell 15s to 16s., and splint 15s. to 15s. 6d. The shipments for the week amounted to 137,491 tons—an increase upon the preceding week of 60,992 tons, and upon the corresponding week of last year of 5102 tons. For the year to date, the total shipments have been 199,990 tons—an increase upon last year of 20,365 tons.

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The Municipal Council of Paris have adopted a proposal made by M. Daix to light the Place de la Concorde with acetylene gas during the forthcoming Exhibition.

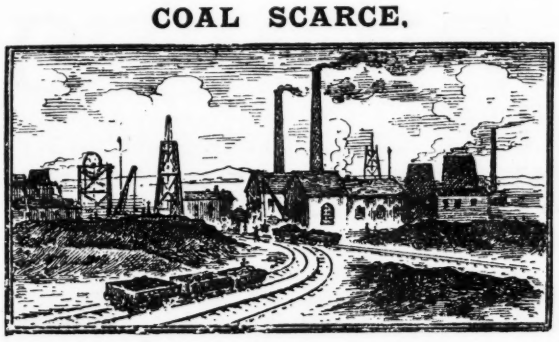
**Electrolysis of Water-Mains in Manchester.**—At the meeting of the Water Committee of the Manchester Corporation last Thursday, attention was drawn to the probable injurious effect of electricity on the water-mains. It was contended that already there is danger to the mains of the city from the electric light installations, and that this will be considerably augmented by the adoption of electricity as the motive power on the tramways.

**Gas-Workers' Wages at Hinckley.**—The Gas Committee of the Hinckley District Council have decided to recommend an increase in the wages of their employees from 4s. 9d. to 5s. per day, and time-and-a-half for Sunday labour from six a.m. to ten p.m.; also that the weight of coal be reduced from 60 cwt. to 50 cwt. This will mean an increased cost of £113 a year, while, irrespective of this, during the past year £300 more was paid in wages than in the previous year. The Chairman stated, at the meeting of the Committee at which the resolution was passed, that notwithstanding this £300 increase, and £500 extra for coal, consequent on the price rising, the Committee are sanguine they will make a profit this year, although £800 was generally considered a good profit to make on the works.

**Fatal Gas Poisoning at Perth.**—Early on the morning of Sunday, the 14th inst., a case of gas poisoning was discovered to have taken place in a house at Perth, occupied by Thomas Cross, dyer's finisher, which resulted in the death of one young lad and the narrow escape of another. Thomas and Alexander Cross, aged 17 and 14 years respectively, occupied one of the rooms in the house, and when they retired to bed on Saturday night everything seemed to be right. Early the next morning, however, their mother perceived a strong smell of gas, and examination revealed that it was proceeding from the lads' room. On opening the door, Mrs. Cross discovered that the room was full of escaped gas. Alexander lay in an unconscious condition, while Thomas had succumbed to the effects of gas poisoning. Alexander's life was saved. Examination showed that the gas had not been properly turned off, and consequently there had been an escape during the whole night.

**Leigh Gas Supply.**—Mr. E. P. Burd, one of the Inspectors of the Local Government Board, held an inquiry at the Town Hall, Leigh, last Friday, into the application of the Corporation of Leigh for sanction to borrow additional money for the purpose of their gas undertaking, and to substitute 3 per cent. per annum or less for the 4 per cent. per annum as the rate of accumulation of the sinking fund provided under the Provisional Order of 1881. The Town Clerk (Mr. Thomas) recounted the history of the gas undertaking, and stated that, as the suggestion for the alteration of the rate of interest came from the Local Government Board, he need not say anything more than that it was obviously the fair and proper thing to do. The Corporation had borrowed altogether for their gas undertaking £125,000. All this had now been expended; and they wished for a further loan of £50,000, in consequence of the rapid development of the town and the great increase of 16 million cubic feet in the consumption of gas during the year. It was imperative that the Corporation should extend their works to meet the growing demands of the town. No opposition was offered to the application.

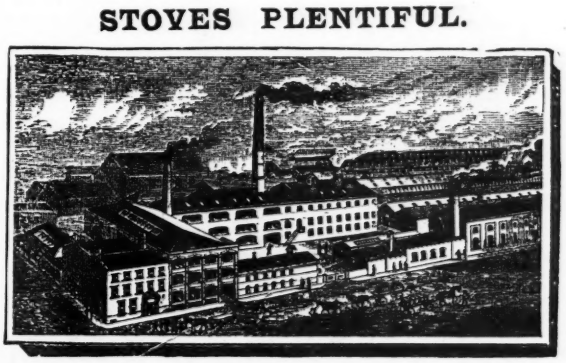

**COAL SCARCE.**



*There is a tide in the affairs of men (and Gas Departments), which, taken at the flood, leads on to fortune.*

*Julius Cæsar IV., 3*

**STOVES PLENTIFUL.**



N.B.—Perhaps the Reader will supply the Advertisers' Name.

**The Rating of Reservoirs.**—At a recent meeting of the Hampton District Council, it was resolved, on the motion of Mr. Allbliss, "That, in view of the recent decision of the House of Lords respecting the rating of reservoirs [*ante*, p. 89], the Council convene a conference of Local Authorities affected thereby; and that it be referred to the Parliamentary Committee of this Council to take the necessary steps, and to report the result of the conference."

**Bingley Gas Affairs.**—At the meeting of the Bingley District Council yesterday week, the Gas Committee reported that the resignation of Mr. G. D. Malam, the Gas Engineer and Manager, had been accepted with great regret; and steps had been taken to obtain applications for the position, which would be considered at a special meeting. Mr. Smith complained of the deficient and unsatisfactory state of the gas supply during the past few weeks. Mr. Gatecliff said the fact was the unsatisfactory state of things had been due to the condition of the exhausters. The Committee were fully alive to the situation; and though it would not be possible to remedy matters this winter, they would take the necessary action. He mentioned that there had been a large increase in the call on the gas-works, which were turning out millions of cubic feet more than previously.

**Bradford Corporation and Outlying Gas Companies.**—The Parliamentary Committee of the Bradford City Council yesterday week discussed matters relating to the promotion of the Corporation Bill. Arrangements were completed for proceeding with the measure; and some discussion took place with regard to the threatened opposition of the several District Gas Companies. It is proposed to apply to Parliament for powers to purchase the undertakings of the Clayton, Allerton, and Thornton Company, the Eccleshill Gas Company, the Airedale Gas Company, and the North Bierley Gas Company, and to purchase gas in bulk from the Drighlington Gas Company. Reference was made to the fact that the Companies have combined for the purpose of opposing the Bill. But it was mentioned that there was a desire among some of them to come to terms; and the Committee accordingly decided to open negotiations with a view to bringing about an amicable settlement.

**The Lighting of Leeds Streets.**—Within a short time, the whole of the public thoroughfares in the centre of Leeds will be lighted by electricity; and some of the main approaches to the city by means of incandescent gas-lamps. At the present time, schemes are being carried out for extending the system of electric illumination from New Briggate to Sheepscar Police Station, and from the Great Northern Railway Station to Kirkstall Road, near the junction with West Street. The Street Lighting Committee have also been authorized to prepare plans for the lighting by electricity of Duncan Street and Lower Briggate. With reference to improving the lighting of the main arteries of the city—such as Woodhouse Lane, Chapeltown Road, Roundhay Road, Kirkstall Road, and Dewsbury Road—the Committee have sanctioned the getting out of an approximate estimate of the cost of the erection and maintenance of incandescent gas-lamps. The result of experiments in Park Row has influenced the Committee in their decision.

**The Hill Brow Water Company, Limited,** has been formed with a capital of £2000, in £5 shares, to carry on at Liss, in Hampshire, Rogate, in Sussex, and elsewhere, the business of a Water Company, and to take over the concern formerly carried on by R. Crafts, deceased, at Hill Brow, Liss.

**The Rival Gas Bills at Ossett.**—On Thursday, the Ossett Town Council held a meeting to confirm the resolution passed on April 12 last for the promotion of a Bill now deposited in Parliament for the purchase of the works and undertaking of the local Gas Company. The confirming resolution was passed; and the Council afterwards unanimously resolved to oppose the Company's Bill for the extension of their capital and powers. One of the speakers strongly objected to the Company's proposal to adopt the sliding-scale, with 3s. 6d. as the standard price. A statutory meeting of owners and ratepayers was subsequently held to sanction the opposition of the Corporation to the Company's Bill.

**The Skipton Gas-Works Purchase.**—At the meeting of the Skipton District Council on Thursday, a communication was read from the Public Works Loan Commissioners, sanctioning a loan of £71,250 for the purchase of the gas-works, the loan to be repaid in principal and interest in 40 years. The Clerk reported that the taxed costs of the Act of Parliament amounted to £2700; and to repay this in ten years would mean an annual payment of £316 11s. 6d. The maximum working capital would be £2000; and to repay this in principal and interest in 30 years would mean £120 a year. It was estimated that the costs of arbitration would be £3500, which would be paid off in 45 years, at the rate of £142 15s. 5d. a year. The total payment in respect of loans would be £3775 per annum. To meet this was a profit of £3712, which was increased to £3828 by striking off expenses incurred by the Gas Company, and which would not be incurred by the Council. It was therefore estimated that there would be a balance to the credit of the town if the profits were not seriously interfered with by the probable increase in the price of coal, &c.

**Incandescent Gas Lighting in Darmstadt.**—The Municipality of Darmstadt have issued a report on the public lighting of the city by incandescent gas-burners in the year 1897-8. Of the total of 1766 lamps, 1742 were fitted with these burners, of which 1754 were in use—four lamps having two, and four others three burners. These burners represented 3,931,606 hours of lighting, during which time 6577 mantles and 4006 glasses had to be replaced. The average life of the mantles was 598 hours; that of the glasses 981 hours. The former lasted 74 hours longer than in the preceding year, but the glasses were less durable. This is explained by the fact that during part of the year some ordinary glasses were used in place of the Jena chimneys previously employed. The latter are now exclusively used. It was found that the mantles and chimneys did not last so long in the lamps against which the ladder had to be placed for cleaning, as in those subjected to the shaking caused by traffic in the streets. There were 141 lanterns which did not require renewals during the whole of the year. The duration of the burners and chimneys in these lamps, therefore, was 5565 hours; being 3830 hours for the all-night, and 1735 hours for the mid-night lamps.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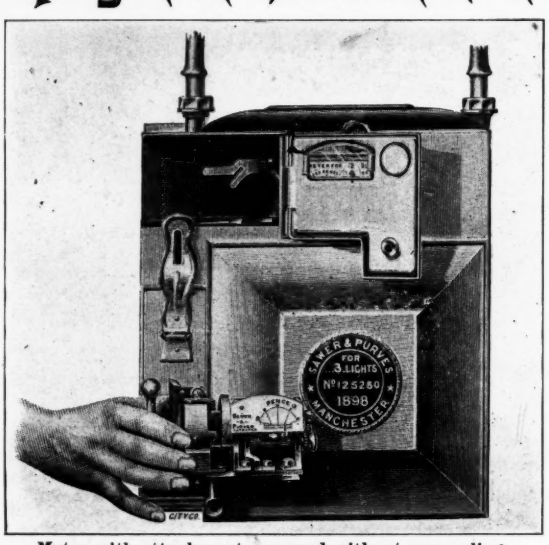


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**The Lighting and Watching Act.**—The "Local Government Journal" recently contained the following observations on the above subject: "We have before commented upon the difficulties experienced by Parish Councils in administering the Lighting and Watching Act, 1833. One of the latest cases to hand raises the question of how a parish council should proceed when it is desired to extend the public lighting beyond the area for which the Act was adopted. There is no provision in the Act to meet such a contingency, nor is any procedure laid down by which a lighting area can be enlarged. The result is that before any such extension of operations can be carried out the Act must be formally 'abandoned,' and after an unavoidable interregnum re-adopted by the parish meeting of the larger area. This, it appears, is the view taken by the Local Government Board."

**The Coal Conciliation Board.**—Last Tuesday the joint conference of coalowners and miners in the federated mining districts, representing about 500,000 miners, met at the Westminster Palace Hotel to determine whether both sides should accept the provisional agreement come to a month ago—viz., that wages should be advanced 5 per cent. conditionally on the maintenance of the Coal Conciliation Board until January, 1904. This question was referred to the respective constituents of the coalowners and the miners; and it was reported to the Board that both sides had accepted the terms of the recommendation. Mr. A. Hewlett presided, and Mr. B. Pickard, M.P., occupied the vice-chair. The conference lasted about two hours, and at its conclusion the following report was issued by the Joint Secretaries—Messrs. T. Ratcliffe Ellis and Thomas Ashton: "The following resolutions were unanimously adopted: (1) That in consideration of the agreement for the continuance of the Conciliation Board from Jan. 1, 1901 (the date of the expiration of the present arrangement), for a further period of three years, with the present minimum and an increased maximum to 60 per cent. on the 1888 standard, the present rate of wages for underground labour be increased as from the first making-up day in January, 1900, by 5 per cent. on the standard, and that the advance as from that day shall be paid on the first pay-day after this date. (2) That for a further period of three years from Jan. 1, 1901 (the date of the present arrangement), the rate of wages shall not be below 30 per cent. above the standard rate of wages of 1888, the present minimum, nor more than 60 per cent. above the standard rate of wages of 1888. (3) That during that period the rate of wages for underground labour shall be determined by the Conciliation Board within the above-named limits. (4) That the Conciliation Board, as at present constituted and under its present rules of procedure, shall be continued for this purpose from Jan. 1, 1901, to Jan. 1, 1904. It was further unanimously resolved to recommend that the advance of 5 per cent. on the 1888 rates as from the first making-up day in January shall extend to the wages of surface labour engaged on the pit banks and screens in manipulating the coal, and be paid on the first pay-day after this date." Practically, the result will be that both the workmen above and below ground will get the advance of 5 per cent. until January, 1901, when either side can summon the Board for an alteration of wages. It is hoped that by this arrangement strikes in the federation area will be prevented.

**Extensions at the Leek Gas-Works.**—Mr. W. A. Ducat recently held at Leek an inquiry on behalf of the Local Government Board with respect to an application of the Urban District Council for sanction to raise £21,000 for gas-works extensions. The Clerk (Mr. W. Allen) made a statement showing that the total indebtedness of the town was £46,561, and that there was still a margin of £90,755. The Gas Manager (Mr. W. H. T. Norfolk) stated that he would not guarantee a proper supply of gas to the town for another year unless the extensions were made. There was practically no opposition.

**The Proposed Gas Company for Heswall.**—At a recent special meeting of the Heswall Parish Council, the report of a Committee was read with reference to the proposed lighting of the town with ordinary and acetylene gas. After a long discussion, the following resolution was passed: "That this Council, having considered the application being made by the Heswall Gas Lighting Company, Limited, to the Board of Trade for a Provisional Order for powers to supply gas (including acetylene gas) in the parish of Heswall, cannot consent to the same, either in respect to coal gas or acetylene gas."

**Carburetted Water-Gas Plant at Bournemouth.**—An installation of carburetted water-gas plant will shortly be in operation at the Bournemouth Gas-Works. Messrs. Humphreys and Glasgow's system has been adopted, and the whole has been arranged and carried out under the Company's Consulting Engineer (Mr. F. S. Cripps). The work involved the erection of new buildings, iron roofs, boilers, exhausters, tanks, gasholder, &c., in addition to the water-gas apparatus. It is in two sections, and sufficient for the production of a million cubic feet of carburetted water gas per 24 hours; but ample space and provision has been made for another two sections in the present house. Everything possible to secure economy of production has been adopted in connection with the plant.

**Shortage of Coal and Increased Gas Consumption at Hunstanton.**—At the last meeting of the Hunstanton District Council, the Gas Manager (Mr. P. E. Hart) reported that the contractor had failed to keep up the supply of coal at the gas-works, and that he had, in the emergency, to obtain ten trucks locally, at an advance of about 5s. 6d. per ton, and with a result of some 2000 cubic feet of gas less per ton. Mr. Beeton said there was no such thing as the "coal famine," and the difference in the cost and the loss in gas should be charged to the contractor. The Chairman (Captain W. Pattrick) acquiesced; and the Manager was instructed to draw up an account showing the amount to be received. He produced a statement showing that there had been an increase of some 10·7 per cent. in the consumption of gas during the past year. The production was on the average 8884 cubic feet per ton of coal. Mr. Beeton said they ought to have 10,000 or 12,000 cubic feet. A report on the gas undertaking was also received from the Engineers. They said that when the new exhauster and scrubber were fixed, there would be hardly any further outlay needed until the consumption had so increased that entirely new works were required. They commented upon the increase in consumption, the present rate of which they thought could hardly be expected to continue. They considered that at least 10,000 cubic feet of gas should be obtained from a ton of coal; and, further, that the leakage should be reduced to 8 per cent.


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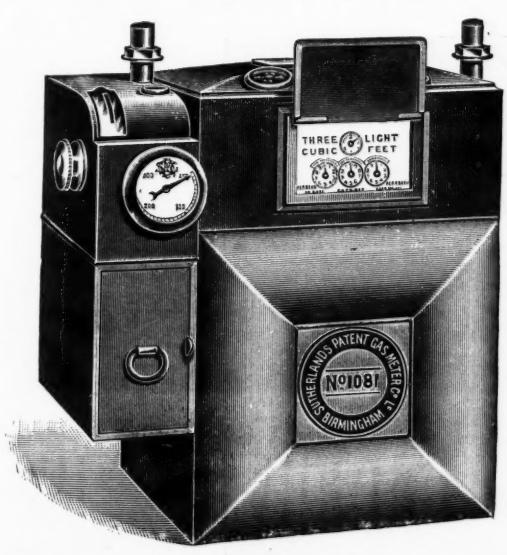


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**Improved Position of Manchester's Stock of Water.**—The recent heavy rainfall has considerably augmented the stock of water in the Manchester Corporation reservoirs; the quantity at present available being sufficient for 104 days' supply, as compared with 87 days rather more than a fortnight ago. Thirlmere is overflowing, and has been so for some days past. A curious fact is that there has been less rainfall at Woodhead than at Gorton; and there has consequently been a less increase in the quantity collected in the former reservoirs than in the latter. The total supply in hand is less than was the case at the corresponding period of last year.

**Plymouth Water Supply.**—At the last monthly meeting of the Plymouth Town Council, Alderman Bond, the Chairman of the Water Committee, reported that during the recent heavy rain the overflow from the storage reservoir at Burrator had been at the rate of 300 million gallons a day, which, if maintained for two days, would be sufficient to fill the reservoir. It may be added that nothing is now heard of the complaints made during the summer and early autumn of the discoloration of the water. Whether the effect of the rain has been to scour the reservoir or to cause a settlement of the matter in suspension, the result is that the water has resumed its former bright appearance.

**Water Supply of Wallasey from the Liverpool System.**—At a meeting of the Wallasey District Council held last Thursday, the minutes presented by the Special Water Committee contained the heads of the agreement to be entered into with the Liverpool Corporation for a minimum supply of 500,000 gallons per day of Vyrnwy water, at the rate of 6d. per 1000 gallons. The Chairman (Mr. J. Paxton) disagreed with the terms. He said the cost of construction had not yet been agreed upon; but, assuming it was £150,000, if the Corporation determined the agreement at the end of ten years, the Council, paying 6½ per cent. on the cost, would have paid £97,500. They would get back from the sinking fund £42,989; leaving £54,511, which they had paid to the Corporation as rent for the pipe-line for ten years. Was this a business-like arrangement? Further, he did not approve of the method of procedure. The Corporation were to be the contractors in laying the pipe, and yet the Council were not to be the owners of it. He did not think the Public Health Act gave the Council power to make such an arrangement as to engage the Corporation as contractors, and he would take no responsibility. The question was: Were they sufficiently protected under the heads of agreement? If not, ought the Committee not to go back and get clauses to give them that protection? Mr. Hughes moved that the matter be referred back to the Council in Committee. Mr. Scott seconded the amendment. Mr. Steel pointed out that they must ask the Corporation to lay the pipe, because the Local Government Board refused to allow the Council to borrow the money. The Corporation's Act of Parliament compelled them to insert the five years' agreement, and the terms were the best they could make. The Corporation would spend £150,000 on the pipe; and it was not probable that they would break the agreement during the thirty years, because they would have to repay the amount standing in the sinking fund. The amendment was lost by 11 votes to 4; and the Committee's proceedings were adopted.

**Increase in the Price of Gas at Durham.**—In consequence of the rise in the price of coal and other material, the Directors of the Durham Gas Company have increased the price of gas in the city by 3d. per 1000 cubic feet. The old price was 2s. 11d.

**Cleveland Water Company.**—The half-yearly report of the Directors of the Cleveland Water Company states that there is a profit balance of £4872, enabling a dividend to be declared at the rate of £9 10s. per cent. per annum on the original and "A" Shares, and £6 13s. on the "B" Shares. This will allow a balance of £1517 4s. 1d. to be carried forward.

**Water-Supply Projects in Essex.**—A public meeting has been held at Stanstead to protest against two schemes which are to be introduced into Parliament by the South Essex Water Company and the South Essex Water Board. Mr. Henry Baker, Clerk to the Stanstead Rural District Council, explained that it was proposed to erect pumping-stations at Heydon, Stanstead, and Henham, which would have the effect of draining all the existing wells. He urged the meeting to oppose the Bills. Mr. H. Green and Mr. H. Chester, J.P., were of opinion that, if this were done by the Council, the costs might be surcharged upon the members; but Mr. E. B. Barnard, J.P., and the Chairman (Mr. W. Fuller, J.P.) were of an opposite opinion. Colonel Byng, the owner of the land on which the Rivers Cam and Chelmer rise, strenuously opposed the Bills, and said he would not sell for the purpose required. On the main question of opposition, the meeting was unanimous, and passed resolutions (1) to oppose at every stage; (2) that a guarantee fund be raised among the landowners; (3) that copies of the resolutions be sent to the Essex County Council, Rural District Council, and Members of Parliament for the Saffron Waldon and Epping divisions; and (4) that petitions be sent from every parish affected.

**A Large Leakage from the Thirlmere Water-Main.**—At the meeting of the Manchester Corporation Water Committee last Thursday, some discussion took place relative to a leakage from the pipe-line from Thirlmere. The pipe is designed to pass 10 million gallons of water daily. It is proved beyond all question that this quantity is received therein every day through the tunnel under Dunmail Raise; but it is said to be ascertained with equal certainty that, within a comparatively short distance from the tunnel, before the aqueduct crosses the Lune, one-tenth of the volume is daily lost by leakage. There is a great fall in levels between the two points, which may account in itself for some slight proportion of the loss; but the full cause has not been explained. Over 8 million gallons find their way to Manchester; but there are several instances of tapping *en route* for legitimate use, and the loss otherwise on this part of the line is not troublesome. It is recognized as highly important that the reasons for the escape of a million gallons every 24 hours should be accurately established, more especially when remembering that before very long it will be imperative to add another pipe of like dimensions to the one now in use to meet the growing demand for water. Consequently the Committee resolved that a close examination of the aqueduct shall be made with this object, when a fitting opportunity presents itself for temporarily shutting off the supply from Thirlmere.


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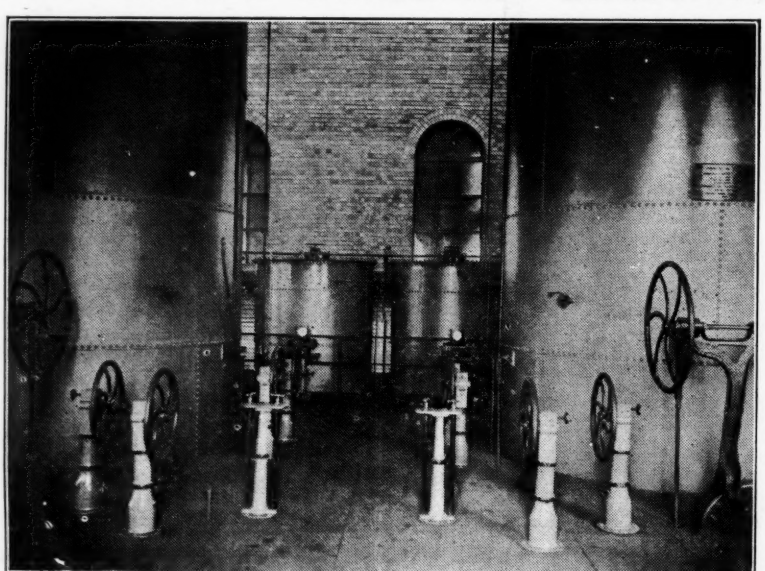

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It is announced that the Blackpool, St. Annes, and Lytham Tramways Company are seeking authority to double their existing lines at a cost of £53,616 12s. 1d., and propose to work the whole system by electricity. Gas-motors are used at present on the line.

At a Trades and Domestic Exhibition now being held at St. Helens, Messrs. John Wright and Co., Limited, of Birmingham, have a very imposing display of their "Eureka" gas-cookers, gas-fires, and other appliances for domestic use with gas as the heating agent.

As from the 1st inst., a scheme of old-age pensions came into operation in Germany. All workpeople whose earnings do not exceed £100 a year will benefit; and the age at which the pension can be claimed is 70. Persons incapacitated through no fault of their own become entitled to relief much earlier.

Messrs. Abel and Imray have taken into partnership Mr. Arthur G. Bloxam, F.I.C., F.C.S., who has for some time been associated with them in business, especially in the chemical department. Mr. Bloxam has held appointments as lecturer in chemistry and practised as a consulting chemist. There will be no change in the style of the firm.

The Horseley Company, Limited, are distributing a very tastefully got-up description of their extensive works at Tipton, Staffordshire, with illustrations prepared from photographs showing views of various parts of the premises and some of the bridges constructed by the Company. The Company have carried out large contracts for roofs, piers, and gas holders.

There have been numerous complaints at Llandudno respecting the deposition of naphthalene in the gas service-pipes, and the consequent insufficiency and quality of the supply. To meet the difficulty, the Gas Manager (Mr. T. Davies) has recommended the Council to purchase a carburetter to enrich the gas as necessity arises. The proposal has been adopted,

At the meeting of the Huddersfield Town Council last Wednesday, the salary of the Gas Engineer and Manager (Mr. E. A. Harman) was raised by £100 for the current year, with a similar increase from Jan. 1, 1901. On the same occasion, the salary of the Assistant-Manager (Mr. Joe Sykes) was advanced from £185 to £200 per annum; and that of the Chief Clerk in the Gas Department from £100 to £110.

Those of our readers who visited the Gas Exhibition at the Royal Aquarium no doubt noticed the attractive display of gas and other fittings made by Messrs. Falk, Stadelmann, and Co., of Farringdon Road, at their stand in the East Section of the area. This branch of their business has attained such proportions as to necessitate the preparation of a catalogue of their fittings for ordinary, incandescent, and acetylene gas lighting, as well as electric accessories, apart from their lamp list; and it has just been issued. It makes quite a bulky book.

Last Wednesday the employees of the Seaham Gas Company, Limited, had their annual dinner in the large office at the works, which was tastefully decorated for the occasion. The Engineer, Mr. J. Whyte, presided, and afterwards addressed the men. He was followed by Mr. Hogg, who spoke very feelingly of the benefits and objects of such gatherings, and of the interest shown by the Directors in the welfare of the men. Mr. J. Thorman, one of the Directors, also addressed a few kind words to those assembled; and Mr. H. B. Wright, the Secretary, assured them of the kindly feeling of the Directors to all in their employment. A most enjoyable evening was spent in songs and games; and votes of thanks to Messsrs. Wright and Thorman, and to Mr. and Mrs. Whyte were passed.

The members of the Leeds Association of Engineers last Tuesday evening paid a visit to the Leeds Corporation Gas-Works, New Wortley. They were introduced by the President of the Association (Mr. J. A. Tempest) to the Manager (Mr. John Bond), who conducted them round the works. After passing through the retort-house, worked by hand, the visitors were shown two methods of stoking by machinery—viz., the West compressed-air and the Arrol-Foulis hydraulic systems, both of which afforded much interest. These machines draw and charge 450 through retorts five times every twenty-four hours, and are manipulated with ease by the machine men. The members also took the opportunity of inspecting several benches of regenerative retort-settings in course of construction.

The Austrian colliery strike movement, says the Vienna Correspondent of the "Daily Chronicle," is now extending over Bohemia, Silesia, and Moravia. Out of about 120,000 hands, a considerable number are already on strike, while the rest are preparing to come out. The movement is for an eight-hour day and an increase of wages. At Kladno (Bohemia), 12,000 hands went on strike on Monday last week. In the northern railway districts of Ostrau and Karwin, where about 40,000 hands are concerned, the employers conceded a part of the men's demands. On the advice of the leaders, therefore, work has been resumed, but only by a section of the men. The scarcity of coal is rapidly increasing, more particularly in Bohemia; and it is said that Prague will very soon be without a supply.

According to the Paris Correspondent of the "Financial News," the railway companies in Russia have been authorized to import up to about 40,000 tons of foreign coal, free of duty. This measure is owing to the growing scarcity of fuel throughout Russia. The Government are striving by every means to hasten the development of the coal deposits discovered in the countries traversed by the Trans-Siberian Railway. They are likewise doing all they can to encourage the utilization of peat as fuel, as considerable deposits of this product are found nearly everywhere throughout the Empire. Trials are being made with peat briquettes specially made for use in blast-furnaces. As to the supply for domestic purposes, the peat fuel prepared in a private factory situated in the neighbourhood of St. Petersburg has given such excellent results that it is proposed to further extend the industry in accordance with new processes now in use in Canada.


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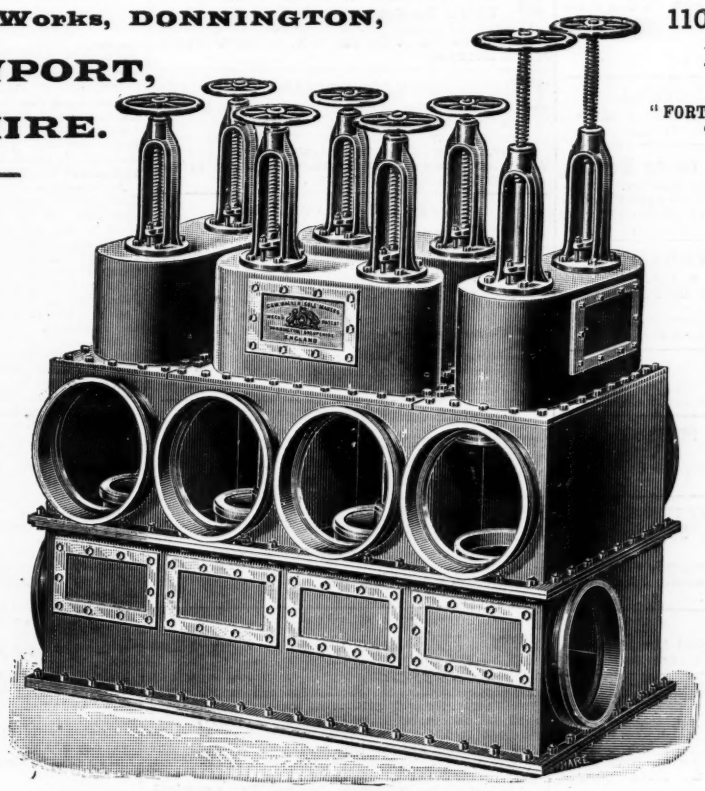

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Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

**GAS TAR wanted.**
BROTHERTON AND CO., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

**BENZOL, specially made for the Enrichment of Gas.**
ELLISON AND MITCHELL, LIMITED, Kilnhurst, near ROTHERHAM.

PRACTICAL RETORT SETTERS.
**BATES & NUTTALL, 32, Havelock** Road, Saltley, Birmingham.
Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

**SPENT OXIDE wanted.**
BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS.

**JOSEPH TAYLOR & CO., Chemical** Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

**J. & J. BRADDOCK (Branch of Meters** Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.
**JOHN NICHOLSON & SONS, Limited,** Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

HYDRATED OXIDE OF IRON.
**PREPARED from Pure Iron.**
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

**ADVERTISER, with good connection** among Gas Companies, will be glad to hear of COMMISSIONS.
Address No. 3415, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**ADVERTISER seeks re-engagement as** SERVICE LAYER. Eleven Years' Experience. Well up in Main Work, Fitting, &c.
Address No. 3418, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO TAR DISTILLERS.
**WANTED, Employment as Carbolic and** CRESYLIC ACID MAKER by a New and Improved Process (guaranteed to save 25 per cent.). Well up in all the latest methods of Tar Distilling.
Address No. 3414, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**WANTED, at once, a good all-round** GAS-FITTER.
Apply, with Testimonials, to the MANAGER, Gas-Works, NANTWICH.

**MANAGER wanted by the Stanley and** District Gas Company (make 18 Millions).
Write, stating Age, Salary required, and enclosing *copies* of two recent Testimonials, to BURN, Stanley R.S.O., DURHAM.

**DRAUGHTSMAN wanted, able to take** out Quantities and make Specifications for Gas-Works Construction and Plant, and with knowledge of general Building Construction and Structural Ironwork.
Apply, stating Salary required, and sending not less than three recent Testimonials of work, to the ENGINEER, Gas-Works, COVENTRY.

NUNEATON GAS COMPANY.
INCANDESCENT GAS LIGHTING.
**WANTED, a competent Man,** accustomed to the adjusting of Burners for Incandescent Gas Lighting, &c. The Applicant must be smart, of good address, and quite capable of undertaking the maintenance of Burners, Mantles, &c., in the Town, and keeping the same continuously in an efficient state.
Apply, stating Age, Wages required, Experience, and References, to G. HELPS, Engineer and Manager, Gas-Works, NUNEATON.

BROMLEY GAS CONSUMERS' COMPANY.
OUTDOOR SUPERINTENDENT OR FOREMAN.
**WANTED, at once, a smart, active Man,** of good address, who thoroughly understands Main and Service Laying, Meter and Stove Fixing, and General Gas-Fitting.
State Age, Experience, Salary expected, and send *copies* of three Testimonials, to
WILLIAM WOODWARD,
Engineer.
Offices and Works: Bromley,
Kent, January, 1900.

GENERAL FOREMAN.
**WANTED, in connection with large** Gas-Works in course of construction in the Midlands, a GENERAL FOREMAN, well educated, and thoroughly acquainted with Modern Gas Plant and Gas Manufacture. Preference given to one who is a good Mechanic, and well versed in Regenerative Settings and Labour-Saving Appliances. Must be energetic, and possess tact in the management and control of Men. Situation permanent to a competent and suitable Man.
Address, giving References, Age, and Wages required, to No. 3417, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS PURIFICATION.
OXIDE OF IRON BOG ORE.
**BALE & CO.'S Oxide of uniform quality.** SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

**SADLER & CO., Ltd., Middlesbrough,** Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

CANNEL, COAL, ETC.
**JOHN ROMANS & SON, EDINBURGH,** Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 30, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

**WANTED, a Gas-Fitter, used to Main** and Service Laying, Meter and Cooker Fixing, and General Fitting.
Apply, with References, stating Age, Experience, and Wages required, to
JOHN E. MILLS,
Manager and Secretary.
Gas Offices, Irthlingborough.

CLACTON URBAN DISTRICT COUNCIL.
**WANTED, immediately, for the Engi-** neer and Manager's Office of the Gas and Water Department, an ASSISTANT who has had previous experience in a Gas Office, and is capable of making neat Tracings.
Salary 25s. per week.
Applications, in Candidates' own Handwriting, stating Age and Experience, together with *copies* of two recent Testimonials, to be sent to the undersigned not later than Four o'clock on Monday, the 5th of February next.
Canvassing will disqualify.
GEO. T. LEWIS,
Clerk.
Town Hall, Clacton-on-Sea,
Jan. 20, 1900.

THE DERWENT VALLEY WATER BOARD.
APPOINTMENT OF ENGINEER.
**BY the Derwent Valley Water Act, 1899,** the Derwent Valley Water Board are authorized to construct six large Reservoirs in the Valleys of the Derwent and the Ashop in Derbyshire, together with important subsidiary Works in connection therewith to deal with an estimated flow of Fifty Million Gallons of Water per day. The Reservoirs will be constructed successively; and the execution of these and the other authorized Works is expected to occupy many Years.
Applications are now desired for the position of ENGINEER to the Board. The Engineer will be responsible for the Designing and Construction of the Works. He will be required to reside in the neighbourhood of the Works, and to devote the whole of his time to his duties under the Board, and to have daily personal charge of the work in hand. The staff of Assistants, Inspectors, Draughtsmen, Clerks, and others necessary in the carrying out of the work will be provided by the Board, and be under the direction of the Engineer.
The engagement will (subject to the services rendered being satisfactory) be certainly until the first two Reservoirs are completed (this work it is estimated will take some Ten Years to carry out), and may be a permanent one. The Engineer on his part will be required to enter into an agreement to remain in the exclusive service of the Board until the fi st two Reservoirs are completed. The Board reserve the power of determining the engagement with the Engineer on giving him Six Months' Notice, in case his services are not considered satisfactory.
It is indispensable that Candidates for the appointment should have had considerable experience in designing and constructing Reservoirs and Gravitation Water-Works.
The Board reserve the right (which they will probably exercise) to appoint, or take the opinion of, a Consulting Engineer or Consulting Engineers on the Works, when and as desired.
Each Applicant must furnish at least two References and *copies* of Testimonials (which cannot be returned, and which preferably should be printed); the Board having the right to call for the production of the originals.
Applicants must state Age, Experience, Present Position, Salary required, when at Liberty, and general state of Health. Personal Canvassing will be a disqualification.
Communications to be sent to me not later than the 10th day of March, 1900, marked on the outside "Derwent Valley Engineer."
JAMES BELL,
Clerk to the Board.
Bowton Buildings, Bowling Green Street,
Leicester, Jan. 17, 1900.

**WANTED, for a Small Gas-Works, a** GAS MAKER who can do light Repairs, Service Laying, and Meter Taking or Fixing. Wages 25s. per week, with House, Coal, and Gas free.
Applications, with recent Testimonials, to be sent to No. 3413, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

STATION METER.

**WANTED, second-hand Station Meter,** capable of passing 50,000 cubic feet per hour.
Apply, by letter, with full Particulars, to No. 3416, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**GAS-FITTING and Electrical Engi**neering Business. Old Established; fine Corner Premises. Rent £120; small Premium for immediate possession.
Agents: HOLMES AND CO., 6, MORTIMER STREET, W.

**IRON ROOF for Sale, 78 feet long by** 58 ft. 4 in. Span, in first-class condition.
Apply to CLAYTON, SON, AND CO., LIMITED, Hunslet, LEEDS.

**ENGINES and Exhausters, from 1500** to 30,000 cubic feet per hour, in Stock, ready for delivery. No reasonable offer refused.
J. F. BLAKELEY, Thornhill, DEWSBURY.

**GAS PLANT for Sale—I can always offer** NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

MANSFIELD CORPORATION.
(GAS DEPARTMENT.)

**FOR SALE—Four 15 feet Square** PURIFIERS, with 12-inch Connections, Centre-Valve, and Lifting Gear, all complete, and in good working order. Being replaced with larger ones.
For further Particulars, apply to
ARTHUR GRAHAM,
Engineer and Manager.

**THE Ludlow Union Gas Company are** prepared to receive TENDERS for Two New PURIFIERS, 12 ft. by 12 ft. by 4 ft. 6 in. deep; and one SIX-WAY CENTRE-VALVE, to work three Boxes. Also one FOUR-WAY VALVE for working one Box on or off, with 8-inch Connections, and fixing the same ready for connecting up.
The Company do not bind themselves to accept the lowest or any Tender.
For further Information and Particulars, apply to Mr. W. H. Whitehouse, Manager at the Works.
Tenders to be sent in to the undersigned on or before the 22nd of February, 1900.
J. W. MONTFORD,
Secretary.
Ludlow Union Gas Company,
Ludlow, Shropshire, Jan. 10, 1900.

**THE Ludlow Union Gas Company are** prepared to receive TENDERS for the CONVERSION of an existing ONE-LIFT GASHOLDER into a TELESCOPIC GASHOLDER of about 40,000 Cubic Feet Capacity in a Tank about 41 ft. 6 in. diameter.
The Company do not bind themselves to accept the lowest or any Tender.
For further Information and Particulars, apply to Mr. W. H. Whitehouse, Manager at the Works.
Tenders to be sent in to the undersigned on or before the 22nd of February, 1900.
J. W. MONTFORD,
Secretary.
Ludlow Union Gas Company,
Ludlow, Shropshire, Jan 10, 1900.

ACCRINGTON DISTRICT GAS AND WATER BOARD.

**THIS Board are prepared to receive** TENDERS for the supply of FIRE-CLAY GOODS as follows:—
For Accrington Works, 84 RETORTS, and about 20,000 BRICKS.
For Great Harwood Works, 56 RETORTS, and about 15,000 BRICKS.
Tenders, endorsed "Fire-Clay Goods," must be in my hands on or before Wednesday, the 7th of February.
By order,
CHAS. HARRISON,
General Manager.
General Offices: St. James' Street,
Accrington, Jan. 15, 1900.

EDINBURGH AND LEITH CORPORATIONS GAS.

CONSTRUCTIONAL IRONWORK.
CONTRACT NO. 20.

**THE Commissioners are prepared to** receive TENDERS for the supply of CONSTRUCTIONAL IRONWORK, comprising ROOFS, FLOORS, STANDARDS, LATTICE GIRDERS, &c., &c., for their Gas-Works at Granton, near Edinburgh.
Specification, Schedule of Quantities, and Form of Tender may be obtained on application to Mr. W. R. Herring, Chief Engineer, Edinburgh, and fully detailed Drawings may be inspected on application at his Office, New Street, Edinburgh.
Tenders, endorsed "Tender for Roofs and Floors," are to be addressed to the undersigned, and delivered at 25, Waterloo Place, on or before Ten a.m. on the 12th day of February, 1900.
The Commissioners do not bind themselves to accept the lowest or any Offer.
JAMES M'G. JACK,
Clerk.
25, Waterloo Place,
Edinburgh, Jan. 17, 1900.

TO CONTRACTORS AND OTHERS.

TENDERS FOR UNDERGROUND WORK IN LONDON.

**THE Postmaster-General invites** TENDERS for the work of laying UNDERGROUND CONDUITS and PIPES for Telephone Purposes in several parts of the Metropolis.
Forms of Tender containing all Particulars may be obtained on application in writing to the undersigned, who will furnish any applicant with a complete set of copies of the Standard Drawings therein referred to on payment of 10s., which amount will be refunded in the event of a *bonâ-fide* Tender being submitted.
Tenders will be received until noon on Monday, the 5th of February, 1900.
The Postmaster-General does not bind himself to accept the lowest or any Tender.
CHAS. E. STUART,
Controller of Stores.
General Post Office,
January, 1900.

CLACTON URBAN DISTRICT COUNCIL.

BRICK GASHOLDER TANK.
CONTRACT NO. 1.

**THE Gas and Water Committee of the** above Council are prepared to receive TENDERS for the construction of BRICK GASHOLDER TANK, 82 feet diameter by 20 feet deep.
Copies of the Specification, Form of Tender, and Drawings may be obtained from the Engineer, Mr. Sydney Francis, Town Hall, Clacton-on-Sea, on payment of Two Guineas, which will be returned on receipt of a *bonâ-fide* Tender.
Sealed Tenders, endorsed "Tender for Gasholder Tank," to be delivered to the undersigned not later than Twelve o'clock noon on Monday, Feb. 5, 1900.
The Committee do not bind themselves to accept the lowest or any Tender.
GEO. T. LEWIS,
Clerk.
Town Hall Buildings,
Clacton-on-Sea, Jan. 22, 1900.

DARWEN CORPORATION.
(GAS DEPARTMENT.)

TENDERS FOR CONVERTING GASHOLDER.

**THE Gas Committee of the Darwen** Corporation are prepared to receive TENDERS for CONVERTING an existing 100 feet diameter TWO-LIFT into a FOUR-LIFT GASHOLDER.
Copies of Specification and Form of Tender may be obtained, and Plans seen, at the Office of Mr. A. H. Smith, Engineer and Manager, Gas-Works, Charles Street, Darwen, on payment of Two Guineas, which will be returned on receipt of a *bonâ-fide* Tender.
Sealed Tenders, endorsed "Gasholder," to be delivered to the undersigned on or before Noon, the 29th inst.
The lowest or any Tender not necessarily accepted.
By order,
CHAS. COSTEKER,
Town Clerk.
Town Clerk's Office, Darwen,
Jan. 10, 1900.

COUNTY BOROUGH OF BLACKBURN.
(GAS DEPARTMENT.)

**THE Gas Committee are prepared to ac**cept OFFERS for the under-mentioned PLANT—
Six PURIFIERS, 25 feet square, 5 feet deep, complete with one Four-Way Dry-Faced Centre-Valve, and one Two-Way Dry-Faced Centre-Valve, Syphons, and 14-inch Connections. Erected in 1882 by Messrs. C. & W. Walker.
Two STATION METERS, 30,000 cubic feet per hour each, erected in 1882 by the Gas-Meter Company, Limited.
Two ROTARY EXHAUSTERS, 30,000 cubic feet per hour each, erected in 1882 by Messrs. Bryan Donkin and Co.
Complete Set of RETORT MOUNTINGS for seven Beds of Through Retorts, seven in a Bed, including separate Hydraulic Main for each Bed, Foul Main, Tar-Pipes, Dip-Pipes, Ascension-Pipes, Mouthpieces, 20 in. by 16 in., &c.
The whole of the above can be seen on application at No. 1. Gas-Works, and any further Information obtained from the undersigned.
S. R. OGDEN,
Gas Engineer.
Municipal Offices,
Blackburn.

LIVERPOOL UNITED GASLIGHT COMPANY.

TAR.

**THE Directors of the Liverpool United** Gaslight Company are prepared to receive TENDERS for the TAR produced at their several Works for a period of One, Two, or Three Years from July 1, 1900.
The quantities of Tar produced per annum are estimated to be as follows; but the same cannot be guaranteed, and may be more or less:—

| | | | |
|---|---|---|---|
| At the Athol Street Works, about | | | 600,000 gallons. |
| " | Eccles Street | " | 530,000 " |
| " | Caryl Street | " | 400,000 " |
| " | Wavertree | " | 550,000 " |
| " | Linacre | " | 2,500,000 " |
| " | Garston | " | 300,000 " |

The Tenders may be for the whole, or for one or more of the Works separately, or for a definite quantity from Linacre Works.
Forms of Tender and full Particulars may be obtained on application to the undersigned.
Tenders, sealed and endorsed "Tender for Tar," are to be delivered here not later than the 20th of February, 1900.
The Directors reserve to themselves the right to accept any Tender in part or in whole, and do not bind themselves to accept the highest or any Tender.
By order
WILLIAM KING,
Engineer.
Gas Office: Duke Street, Liverpool,
Jan. 17, 1900.

SHEFFIELD UNITED GASLIGHT COMPANY.

TO RETORT AND FIRE-BRICK MAKERS.

**THE Directors of this Company invite** TENDERS for the supply of RETORTS, FIRE-BRICKS, and TILES for the construction of Fifteen Settings of Ten Retorts each, at their Grimesthorpe Works.
Specifications, Quantities, and Forms of Tender may be obtained from the Company's Engineer, Mr. J. W. Morrison, on and after the 24th inst.
The Directors do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, marked "Tender for Fire-Clay Goods," must be delivered to the undersigned, by post, not later than the first post on Friday, the 9th day of February next.
HANBURY THOMAS,
General Manager and Secretary.
Commercial Street,
Sheffield, Jan. 16, 1900.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

**MR. ALFRED RICHARDS begs to** notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.
He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.
Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

NEW ISSUE OF £2800 ORDINARY STOCK.

**MR. ALFRED RICHARDS will Sell** BY AUCTION, at the Mart, E.C., on Tuesday, the 30th of January, 1900, at Two o'clock, in Lots,
£2800 OF NEW ORDINARY STOCK IN THE ABOVE UNDERTAKING,
Ranking for a Standard Dividend of 7 per Cent., subject to the Sliding-Scale; the last Dividend on similar Stock in the Company having been 12½ per cent.
Particulars of the AUCTIONEER, as above.

By order of the Directors of the
LOWESTOFT WATER AND GAS COMPANY.

£2500 FOUR PER CENT. PERPETUAL DEBENTURE STOCK AND 500 £10 SHARES.

**MR. ALFRED RICHARDS will Sell** THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Jan. 30, 1900, at Two o'clock, in Lots.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
ILFORD GAS COMPANY.

NEW ISSUE OF £7000 ORDINARY STOCK.

**MR. ALFRED RICHARDS will Sell** THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Feb. 13, 1900, at Two o'clock, in Lots.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

THE FREEHOLD GAS-WORKS AT BAGSHOT, SURREY.

**MR. ALFRED RICHARDS begs to** notify that the Sale by Auction advertised to take place on the 30th inst. HAS BEEN POSTPONED until a later date.
AUCTION OFFICES: 18, FINSBURY CIRCUS, E.C.

SUNDERLAND AND SOUTH SHIELDS WATER COMPANY.

IMPORTANT SALE OF WATER STOCK.

**TO BE SOLD by Auction in the Long** Room of the Queen's Hotel, Fawcett Street, Sunderland, on Thursday, Feb. 22, 1900, at Two o'clock in the Afternoon prompt.
MR. ATKINSON GIBSON, AUCTIONEER,
£25,000
(Nominal) of the New Stock (maximum Dividend 5 per cent.) authorized to be created and issued under the powers contained in the Sunderland and South Shields Water Act, 1891.
The above Stock will be entitled to Dividend from the 1st day of January, 1900, and be registered in the name of the Purchaser free of charge.
A Deposit of 10 per cent. will be required at the time of Sale; the remainder to be paid on or before the 1st day of March, 1900.

SOUTH METROPOLITAN GAS COMPANY.

**NOTICE is Hereby Given, that the** ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Cannon Street Hotel, in the City of London on Wednesday, the 14th day of February next, at Two o'clock in the afternoon precisely, to receive the Directors' Report and the Accounts of the Company for the Half Year ended the 31st of December last, to declare a Dividend for the same period, and to elect two Directors and one Auditor in the place of those retiring by rotation.
The TRANSFER BOOKS WILL BE CLOSED from the 31st day of January until after the Meeting.
By order,
FRANK BUSH,
Secretary.
Offices: 709A, Old Kent Road, S.E.,
Jan. 20, 1900.

THE GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that a HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors in this Company will be held at this Office on Friday, the 2nd day of February next, at Twelve o'clock (noon) precisely, to transact the usual Business, including the declaration of a Dividend for the Half Year ending on the 31st day of December last; and to elect Directors and Auditors in the place of three Directors and two Auditors who will at such Meeting go out of Office, in compliance with the Company's Acts or Schemes of Amalgamation, one of which Auditors has given notice that he will not offer himself for re-election.

Notice is Hereby also Given, that at such Meeting the Directors will apply to the Proprietors for authority to DISPOSE OF SUCH FURTHER PORTION OF THE COMPANY'S PROPERTY as is not now required for the purposes of their Undertaking.

Notice is Hereby further Given, that, pursuant to the Standing Orders of both Houses of Parliament, an EXTRAORDINARY GENERAL MEETING of the said Proprietors will be held at the same Office immediately after the said Half-Yearly Ordinary General Meeting, when a Bill to be introduced into Parliament, intituled "A Bill to Enable The Gaslight and Coke Company to Raise Additional Moneys and to Purchase, Take, and Hold Lands, and for other Purposes," will be submitted to the Proprietors then present, either in person or by proxy, for their approval.

By order,
JOHN WILLIAM FIELD,
Secretary and General Manager.

Chief Office: Horseferry Road,
Westminster, S.W., Jan. 15, 1900.

NOW READY.

*Price, Bound in Cloth, 5s. 6d., Post Free.*

— SEVENTEENTH YEAR —

THE
COMPLETE REPORTS
OF PROCEEDINGS
OF THE
DISTRICT ASSOCIATIONS
OF
GAS ENGINEERS & MANAGERS
OF THE UNITED KINGDOM
FOR 1899.

The Sixteen previous Volumes are still on Sale.

LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

COKE-BREAKERS,
PRICES REDUCED.
(THOMAS & SOMERVILLE'S PATENT)
With Elevators and Conveyors worked by Steam or Gas Engine.

GEORGE WALLER & CO.,
165, QUEEN VICTORIA STREET, E.C.;
*And at STROUD, GLOUCESTERSHIRE.*

LONDONDERRY GAS COALS
FROM THE
LONDONDERRY COLLIERIES,
COUNTY OF DURHAM.
Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal
as per Analysis by
Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO
S. J. DITCHFIELD,
SEAHAM HARBOUR,
COUNTY OF DURHAM.

NITRATE of Thorium and Cerium.
FABRIK CHEMISCHER PRAEPARATE VON STHAMER NOACK, AND CO., HAMBURG.

GAS PLANT New or 2nd Hand Equipments for Coal Gas, Water Gas, Oil, Acetylene, Coke Oven, and Blast Furnace Gas.
POWER or LIGHT WORKS.
Also VALUATION Consultation, Inspection, & Expert Reports.
JAS. WRIGHT, M.I.M.E. BRIDGE HOUSE, BLACKFRIARS, E.C.

GAS BURNERS AND MANTLES
100 Burners, 32s.
100 Transparent Mantles, 18s.
*Sent free by post for Cash by*
SIEGEL & CO. Manufacturers, 42 BERLIN, S.

HARDMAN & HOLDEN, LD.
ESTABLISHED 1820.
SULPHURIC ACID.
GUARANTEED absolutely free from Arsenic and of excellent Purity. Specially prepared for Sulphate of Ammonia Manufacturers.
Works: BLACKBURN; Miles Platting and Clayton, MANCHESTER.
Head Office: Miles Platting, MANCHESTER
Inquiries Solicited.

HOLMSIDE
GAS COALS.
Present Daily Produce over 5000 Tons.
*Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation*

| | |
|---|---|
| Yield of Gas per Ton | 11,205 Cubic Feet. |
| Illuminating Power | 16 $\frac{7}{10}$ Stand. Sperm. Candl. |
| Coke (of good & pure quality) | 13 $\frac{3}{4}$ Cwt. per Ton. |
| Sulphur | A little over 1 per Cent. |
| Ash | Under 1 per Cent. |
| Tar | 163 lbs. (Avoir.) per Ton. |
| Ammoniacal Liquor | 103 lbs. (Avoir.) per Ton. |

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR
PELTON GAS COALS.
Present Daily Produce available 3000 Tons.
Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.
Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.
These Coals may be bought through the Principal Merchants in England, or direct from
MR. MARK ARCHER,
HOLMSIDE & SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH N.B.

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
*Prices and Analysis on application.*
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

THOMAS TURTON
AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for
CANNEL & COAL.

TYNE
BOGHEAD
CANNEL.

| | |
|---|---|
| Yield of Gas per ton | 13,155 cub. ft. |
| Illuminating Power | 38·22 candles. |
| Coke per ton | 1,301·88 lbs. |

EAST PONTOP
GAS COAL.

| | |
|---|---|
| Yield of Gas per ton | 10,500 cub. ft. |
| Illuminating Power | 17·8 candles. |
| Coke | 70 per cent. |

SOUTH PELAW MAIN
GAS COAL.

| | |
|---|---|
| Yield of Gas per ton | 10,500 cub. ft. |
| Illuminating Power | 16·3 candles. |
| Coke | 73·1 per cent. |

*For Prices and complete Analysis, apply to*
THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
21 JOHN STREET, ADELPHI, LONDON, W.C.

**TROTTER, HAINES, & CORBETT,**
**Brettell's Estate**
**FIRE-CLAY & BRICK WORKS,**
**STOURBRIDGE.**

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 34, OLD BROAD STREET, E.C.

**WELDON MUD**
FOR
**GAS PURIFICATION.**
For use in the
**RECOVERY OF SULPHUR,**
ALSO
**Removal of last Traces of SULPHURETTED HYDROGEN in catch position.**

Full Particulars on application to the Patentees:
**GAS DESULPHURIZATION CO.,**
— LIMITED. —
**1, FENCHURCH AVENUE, LONDON, E.C.**

DISPENSE WITH CANNEL COAL
and
INCREASE YOUR ILLUMINATING POWER
by using the
**WHESSOE-MUNICH BENZOL CARBURETTER**
**The Cheapest and Best in the Market.**
The Managers of Tynemouth, Middlesbrough, and Darlington Gas-Works are much pleased with it, and would not be without it.
Apply to the Sole Makers:
THE WHESSOE FOUNDRY COMPANY, LIMITED
DARLINGTON.

**THORNLEY GAS COALS**
WORKED BY THE
**WEARDALE IRON & COAL Co., Ld.**
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
**Messrs. J. & H. S. PATTINSON.**

| | |
|---|---|
| Yield of Gas per Ton . . | 10,500 Cub. Ft. |
| Illuminating Power . . . | 16·9 Candles. |
| Coke (of good quality) . . | 67·5 per Cent. |
| Sulphur . . . . . | 0·58 ,, |
| Ash . . . . . | 2·73 ,, |

For Price, &c., apply to the
**WEARDALE IRON & COAL Co., Ld.**
QUAYSIDE, NEWCASTLE-ON-TYNE.

**JAMES OAKES & CO.**
**ALFRETON IRON-WORKS, DERBYSHIRE,**
AND
**Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,**
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

**BOLDON GAS COALS.**

ANALYSIS.

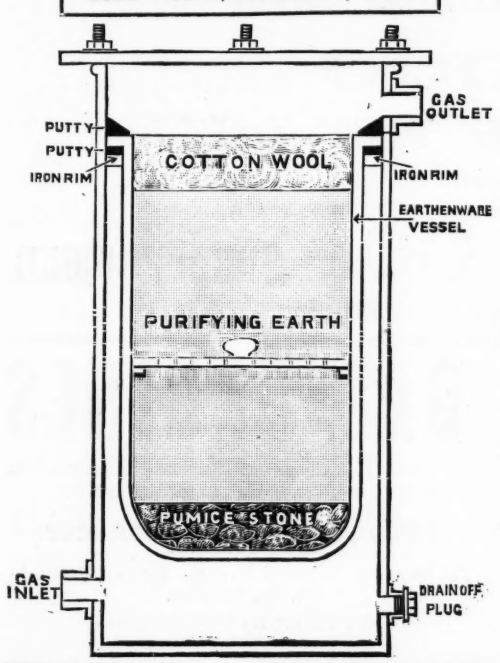
| | |
|---|---|
| Yield of Gas per Ton. . | 10,500 Cubic Feet. |
| Illuminating Power . . | 16·9 Candles. |
| Coke . . . . . | 66·7 Coke. |
| Sulphur . . . . . | 0·86 Sulphur. |
| Ash . . . . . | 2·04 Ash. |

For Prices, &c., apply to
**W. H. PARKINSON,**
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.
Telegraphic Address: "PARKINSON, NEWCASTLE."

**HARRIS & PEARSON,**
**STOURBRIDGE, ENGLAND,**
MANUFACTURERS OF
**FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.**
GLAZED BRICKS AND PORCELAIN BATHS.

**FRANKS' PATENT ACETYLENE PURIFIER.**

GOLD MEDAL, BUDAPEST, 1899.




**"FRANKOLIN"**

**The only perfect System** of Purifying Acetylene, and rendering it serviceable for Domestic Lighting **without reducing the Illuminating Power.**

Can be attached to any existing Generator.

Removes all **Phosphuretted Hydrogen, Sulphuretted Hydrogen, Ammonia,** and other **Impurities.**

Prevents Carbonizing and **Choking of the Burners**; also **Noxious Products of Combustion** and Haze in Rooms.

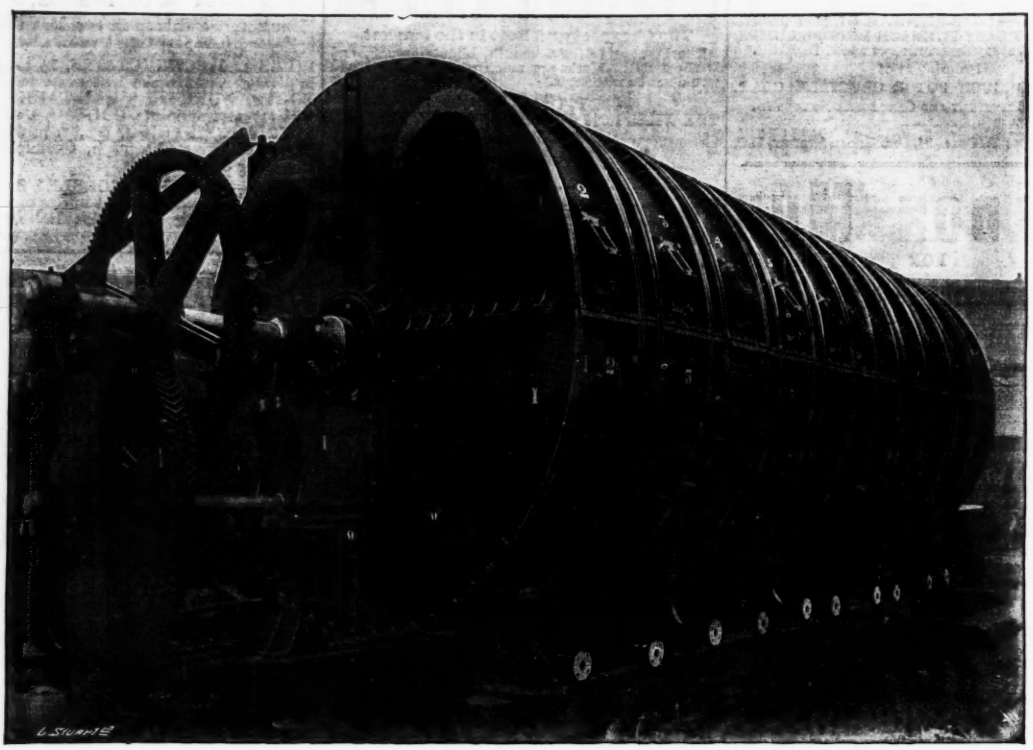
**Obviates all risk of Explosion** through a mixture of Gas and Air.

Full Particulars and Prices from the Manufacturers (under Licence from the Acetylene Purifying Company, Ltd.)—

**FALK, STADELMANN, & CO., LTD.,**
"VERITAS" LAMP WORKS,
83-87, FARRINGDON ROAD, LONDON, E.C.

# PATENT "NEW" SCRUBBER-WASHER

RESULTS GUARANTEED.



RESULTS GUARANTEED.

Photo. of Machine now being erected at Gaythorn Gas-Works, Manchester.

**NOTE:** Orders already received in

**1900**

For **MACHINES** to deal with

**18,000,000**

**CUBIC FEET OF GAS PER DIEM.**

Patentees and Sole Makers:

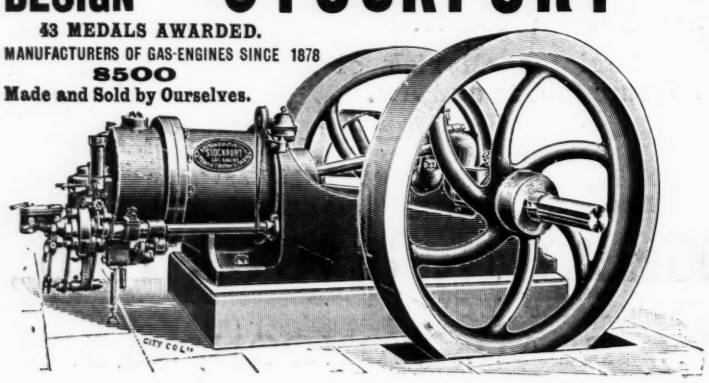
## W. C. HOLMES & CO., WORKS: HUDDERSFIELD.

TELEGRAMS: "IGNITOR, LONDON." "HOLMES, HUDDERSFIELD."

---

## NEW DESIGN "STOCKPORT" GAS-ENGINES

43 MEDALS AWARDED.
MANUFACTURERS OF GAS-ENGINES SINCE 1878
8500
Made and Sold by Ourselves.



With Otto Cycle and our own Patented Improvements.
All Sizes from 1½ H.P. to 250 Brake H.P.

SEND FOR LATEST PRICE LIST.

The Greatest Brake H.P. given for the Smallest Gas Consumption.
SIMPLE IN EVERY DETAIL.

**J. E. H. ANDREW & CO., LTD.**
REDDISH, near Stockport.
London Address: 80, QUEEN VICTORIA STREET, E.C.
*DEPÔTS IN ALL THE PRINCIPAL TOWNS.*

# PUBLIC CAUTION!!

The Trade and the Public are warned against the **INFERIOR IMITATIONS of the NEW WELSBACH (KERN) BURNER** lately placed upon the Market. All DEALERS and USERS of the

## NEW WELSBACH (KERN) BURNER

are requested to IGNORE THE NEWSPAPER THREATS of the New Sunlight Incandescent Company, Limited, and, in case of an action being brought, TO AT ONCE COMMUNICATE WITH THE WELSBACH COMPANY, who, upon receipt of the writ, are prepared to take the defence of the action into their own hands, and to indemnify the person attacked from all consequences.

## MANTLES.

DEALERS and USERS are also WARNED not to believe the rumours circulated by Infringers that the

## WELSBACH COMPANY'S PATENT RIGHTS

expire shortly. These rights

## EXIST UNTIL 1907

and the Company will continue to uphold their rights, and to **suppress all Infringers of Mantles as well as of Burners.**

The Welsbach Company are doing their best to hasten the trial of the action now pending in respect of the

## SUNLIGHT COMPANY'S WHITE MANTLE

which, it is claimed, is an

## INFRINGEMENT OF THE WELSBACH PATENTS.

**Dealers and the Public are Cautioned against Buying, Selling, or Using the said Mantle.**

THE

## WELSBACH INCANDESCENT GAS-LIGHT CO., LIMITED,

*76-80, YORK STREET, WESTMINSTER, LONDON, S.W.*

# INCLINED RETORTS

## UP-TO-DATE FURNACES

## AND SETTINGS.

**J. & H. ROBUS,** 20, Bucklersbury, London, E.C.

# MOBBERLEY & PERRY

**STOURBRIDGE.**

Manufacture & supply best quality of

**Gas Retorts** (SEGMENTAL, HORIZONTAL, or INCLINED.)

Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

FIRE BRICKS, LUMPS, & TILES; BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c. &c.

*EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.*

London Agents: Contractors for the erection of Retort-Benches complete.

**BALE & HARDY,** Gas Engineers and Contractors, BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, E.C.

Telephone No. 103. Telegraphic Address: "ELEVATOR, HASLINGDEN."

# S. S. STOTT & CO.,

ENGINEERS, **HASLINGDEN,** NR. MANCHESTER.

COAL AND COKE ELEVATORS & CONVEYORS.

COAL AND COKE STORAGE PLANTS.

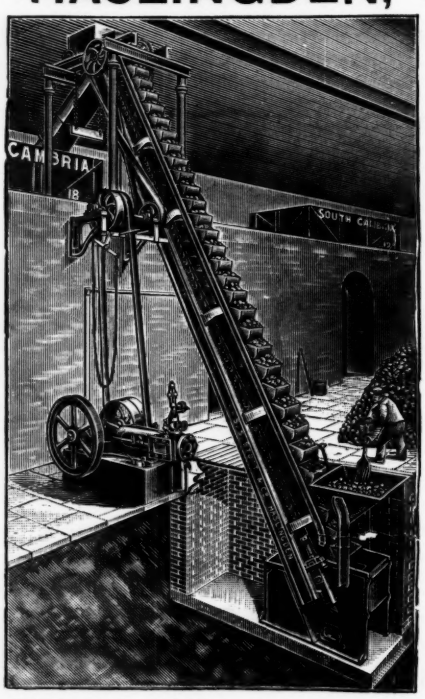
COAL AND COKE BREAKERS.

WHARF ELEVATORS FOR UNLOADING BARGES.

ELEVATORS & CONVEYORS for BOILER-HOUSES.

STAMPED AND RIVETED STEEL ELEVATOR BUCKETS.

DETACHABLE CHAINS AND SPROCKET WHEELS.




Coke Elevator Loading Railway Waggons.

LIME AND OXIDE ELEVATORS & CONVEYORS.

HIGH-CLASS **STEAM-ENGINES** up to 1000-Horse Power.

**PUMPS,** HORIZONTAL AND VERTICAL, SINGLE, DOUBLE, or THREE-THROW, for WATER-WORKS, &c.

BEAM PUMPING-ENGINES.

AIR-COMPRESSORS.

BELT PULLEYS, ROPE PULLEYS, GEARING, &c., &c.

THE

# DENAYROUZE LIGHT SYNDICATE

LIMITED,

28, VICTORIA ST., WESTMINSTER, S.W.

---

# THE PIONEERS

# OF INCANDESCENT BURNERS

## WITHOUT CHIMNEYS.

---

The "SMALL TORCH" Burner (Bandsept Patent) for Street Lighting, consuming 3½ feet of Gas per hour. Having an efficiency of 25-Candle Power per Cubic Foot of Gas consumed, it is not only the BEST but CHEAPEST Intensive CHIMNEYLESS Burner on the Market.

## PRICE COMPLETE WITH MANTLE

## 4s. 9d.

*All other Burners supplied by the Syndicate proportionately Reduced from January 1, 1900, full Particulars of which will shortly be issued to the Trade, and followed by new and complete Catalogue.*

---

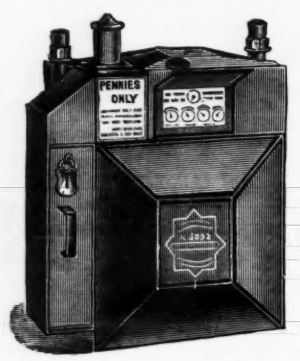
*NOTE*—THE DENAYROUZE LIGHT SYNDICATE has carried out the work in connection with all the Installations of Van Vriesland's Oil Gas in England, together with the entire work and fitting of the Grand Exhibit in North West Gallery for the Gas and Allied Trades Exhibition to be held at the Royal Aquarium, Westminster, from Dec. 21, 1899, to Jan. 23, 1900, where all their Burners can be seen in operation.

# FRANK WRIGHT'S

## PREPAYMENT GAS-METER CORPORATION, LIMITED,

## Dry Gas-Meter Manufacturers.

# THE




*THE ADVANTAGES OF OUR METER ARE--*

1. IS AUTOMATIC.
2. Simplicity of Mechanism.
3. Absolute Accuracy.
4. Impossibility of being Tampered with.
5. Unaffected by Bent or Battered Coins.
6. Extra large Money-Box.
7. Price Changer can be altered without otherwise disturbing Meter.
8. Index showing the number of Pennies in the Mechanism at any time.
9. Rejection of Half-Pennies certain.

**Guaranteed for Five Years.**

Offices and Works: 62, GLENGALL ROAD, S.E.

Telegraphic Address: "GASOMETER, LONDON." Telephone No. 1259 HOP.

---

# THE "DE BROUWER"

# PATENT COKE-CONVEYOR

**FOR ELEVATING AND CONVEYING.**

SUPERSEDES ALL OTHERS FOR DEALING AUTOMATICALLY WITH

## — HOT COKE. —

**DOES NOT BREAK THE COKE. SIMPLE AND EFFECTIVE.**

## 25 INSTALLATIONS now at Work.

SUITABLE FOR SMALL AS WELL AS LARGE RETORT-HOUSES.

GUARANTEED BY SOLE MAKERS:

## W. J. JENKINS & CO., Ltd., RETFORD.

# NEW SUNLIGHT INCANDESCENT CO., LTD.

## 33-34, SHOE LANE, LONDON, E.C.

THE

# "SIMPLEX" CHIMNEYLESS BURNER

**Manufactured under the De Mare MASTER Patent and subsequent Minor Patents.**

## SEE CAUTION BELOW.

*IN THREE SIZES, as follows—*

**No. 2.**
COTTAGE SIZE.

**No. 3.**
FOR SHOP AND INTERIOR LIGHTING.

**No. 4.**
STREET LIGHTING.

*With SUNLIGHT WHITE MANTLE.*

The "Simplex" is fitted with a Removable Cap and an Air-Adjusting Ring, making it quite easy for anyone to adapt the Burner to the very varying Pressures and Qualities of Gas in different parts of the country.

The "Simplex" Burner is so constructed as to make the light practically shadowless; and this, coupled with the fact that it is of a much more artistic shape, gives it an enormous advantage over the very unsightly competing infringement for the moment on the market.

**Maximum Light (without artificial pressure) 125 Candle Power.**

# CAUTION! CAUTION!! CAUTION!!!

## INCANDESCENT GAS LIGHTING.

All Dealers and the Public are **CAUTIONED** against Buying, Selling, or Using "**NEW WELSBACH**" (commonly known as the "**KERN**") **BURNERS.**

**ACTIONS FOR INFRINGEMENT OF PATENT HAVE BEEN COMMENCED** by the **NEW SUNLIGHT INCANDESCENT COMPANY, LIMITED**, against the **WELSBACH COMPANY** for Infringement of the **DE MARE PATENT** by the **MANUFACTURE AND SALE** of such Burners, and are about to be commenced against Dealers and Users for Infringement of our Patent in respect of their Sale or Use. **USERS** are equally liable with **DEALERS.**

# NEW SUNLIGHT INCANDESCENT CO., LTD.

## 33-34, SHOE LANE, LONDON, E.C.

MAURICE GRAHAM. Telegrams "ACCOUPLE" LEEDS.

GRAHAM, MORTON & Co. Ltd.

CONTRACTORS TO H.M. GOVERNMENT.

SEE OUR ILLUSTRATED CATALOGUE

INCLINED RETORTS

ELEVATORS & CONVEYORS

Works; BLACK BULL STREET, LEEDS.

JOSEPH EVANS & SONS, CULWELL WORKS, WOLVERHAMPTON.

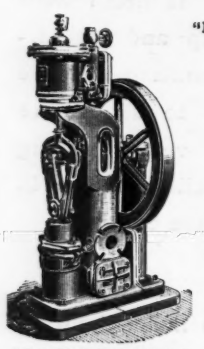
Telegrams: "EVANS, WOLVERHAMPTON." PLEASE APPLY FOR CATALOGUE No. 8. National Telephone No. 7089.

12,000 PUMPS IN STOCK AND PROGRESS.

TRADE MARK.

NO TAPPETS.

LION WOLVERHAMPTON



"Fig. 705. SINGLE RAM" STEAM-PUMP.

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

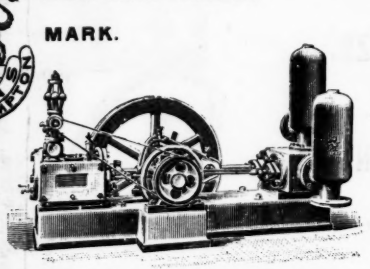


Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

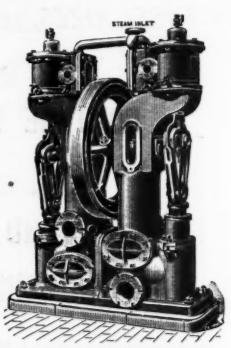


Fig. 719. "DOUBLE-RAM" STEAM-PUMP.

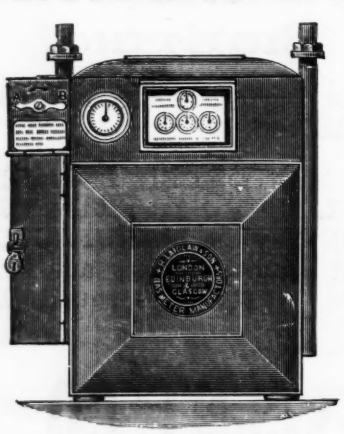
R. LAIDLAW & SON

GAS & WATER ENGINEERS.

MANUFACTURERS OF WET & DRY GAS-METERS,

SIEMENS WATER-METERS,

PREPAYMENT GAS-METERS.



—DRY METER.—

—WET METER.—

EDINBURGH: SIMON SQUARE WORKS. | GLASGOW: ALLIANCE FOUNDRY. | LONDON: 6, LITTLE BUSH LANE.

# EVERED & CO., LTD.,

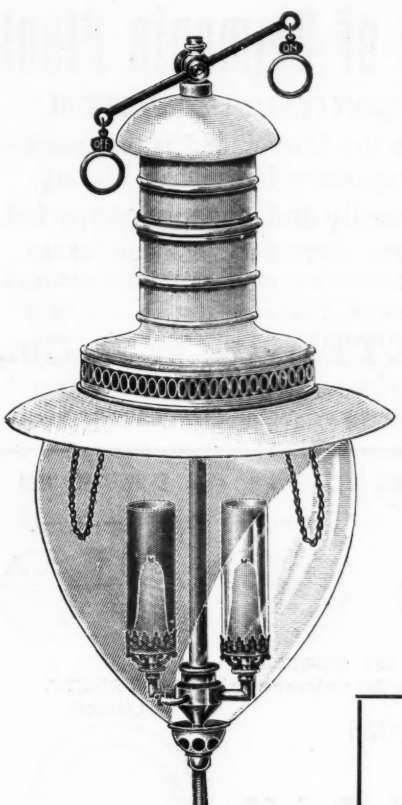
27 TO 35, DRURY LANE, LONDON.
SURREY WORKS, SMETHWICK.
BARNET WORKS, BIRMINGHAM.

*Gas-Fittings Manufactory—SURREY WORKS, SMETHWICK.*

THE

# NEW "DRURY" SHOP LAMP

## *For Inside and Outside Lighting.*



No. 2021.
WINDOW LIGHT.

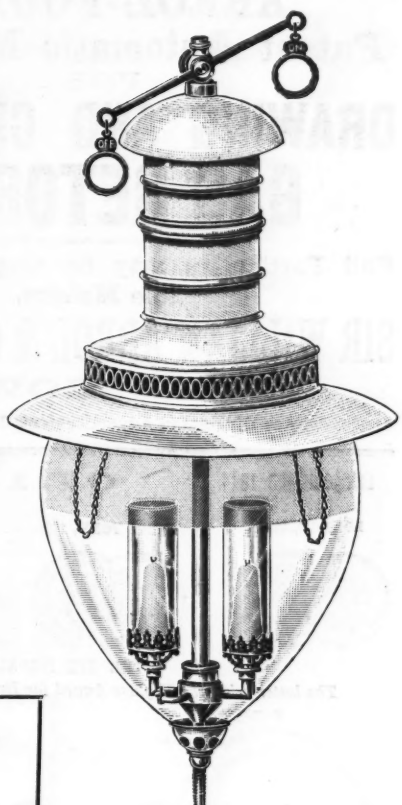
NEATLY ENAMELLED
IN FAWN COLOUR WITH
WHITE AND GOLD RELIEF.

**No. 2020** is for Inside Lighting, with clear flint Globe.

**No. 2021** is for Window Lighting, and has a diagonally obscured Globe.

**No. 2022** is for Lobby Lighting, and has an opal top Globe.

A similar Lamp made for Electric Light.



No. 2022.
LOBBY LIGHT.

**Prices:—**

| | 1-Light. | 2-Light. | 3-Light. |
|---|---|---|---|
| No. 2020 | 40s. 6d. | 52s. 6d. | 58s. 6d. each. |
| No. 2021 | 42s. 6d. | 55s. 6d. | 61s. 6d. „ |
| No. 2022 | 50s. 9d. | 66s. 0d. | 72s. 0d. „ |

**Subject to Trade Discount.**

MANUFACTURERS OF

**Gas Joints in every form suitable to the requirements of Gas Companies and the Trade generally.**

## CASES FOR BINDING VOLUMES OF THE "JOURNAL"

*(GREEN CLOTH, GILT LETTERED)*

**MAY BE HAD OF THE PUBLISHER**

*PRICE 2s. EACH.*

## THE THAMES BANK IRON CO.

**UPPER GROUND STREET, LONDON, S.E.,**

SUPPLY FROM STOCK

**CAST-IRON RETORTS**

**AND ALL KINDS OF GAS-WORKS APPARATUS.**

SOCKET-PIPES FOR GAS OR WATER PURPOSES.

FLANGE PIPES FOR STEAM.

**Sole Manufacturers of LYON'S "PATENT" GAS-MAIN SYPHONS.**

AGENTS FOR

*ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.*

## ARROL-FOULIS

**Patent Automatic Machinery**

FOR

## DRAWING AND CHARGING GAS-RETORTS.

**Full Particulars may be obtained from the Sole Makers,**

## SIR WILLIAM ARROL & CO., Limited,

**GLASGOW.**

**[See Illustrated Advertisement, Jan. 2, p. 56.]**

## THOMAS BUGDEN,

Manufacturer of

**Bellows for Inflating Gas-Bags. Made in various sizes.**

**Bellows made to inflate a 48-inch Bag under One Minute.**

**Miners' Woollen Jackets.**

India-rubber Hose, Sheet, and Washers of every description, Leather Bands, Oils, &c., Diving and Wading Dresses, Waterproof Coats, Capes, and Sewer Boots.

**Stokers' Mitts, from 14s. doz.**

**Special Air Tubing made for Gas Companies.**

**Gas-Bags for Mains.**

71, GOSWELL ROAD, E.C., AND AT

256, PENTONVILLE ROAD, KING'S CROSS, N.

***PETTIGREW'S PATENT***

## Sulphate of Ammonia Plant

**ON THE CONTINUOUS SYSTEM**

**Is the newest in the Market, and is the outcome of practical experience in Sulphate Making.**

**Old Systems easily and cheaply converted.**

**ANY SIZE ERECTED COMPLETE AT HOME OR ABROAD.**

**Makers of Self-Emptying Saturators.**

**Write for Particulars, Testimonials, and References to**

## GEO. PETTIGREW & Co.,

**GAS AND CHEMICAL ENGINEERS,**

***MIDDLESBROUGH-ON-TEES.***

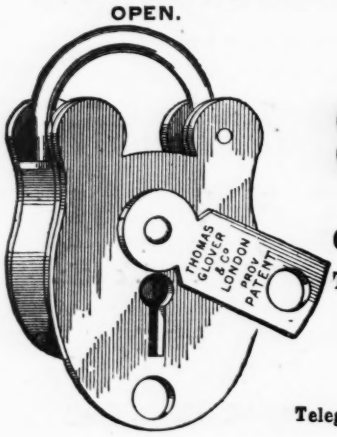
**ESTABLISHED 1844.** **ORIGINAL MAKERS.** **ESTABLISHED 1844.**

**LONDON, 1851.** **NEW YORK, 1853.** **PARIS, 1855.** **LONDON, 1862.** **DUBLIN, 1865.** **PARIS, 1867.**

**THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;**

*The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.*

**OPEN.**




THOMAS GLOVER & CO.'S

**PATENT**

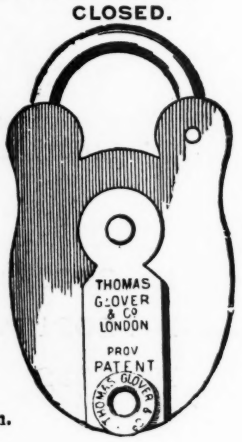
## SECURE PADLOCK

PREVENTS TAMPERING WITH THE

**CASH-BOXES OF PREPAYMENT METERS.**

**The Padlock is Sealed by means of a Lead Eyelet, which is impressed with Company's private mark. Eyelets easily fixed and removed by Company's Collector.**

**CLOSED.**

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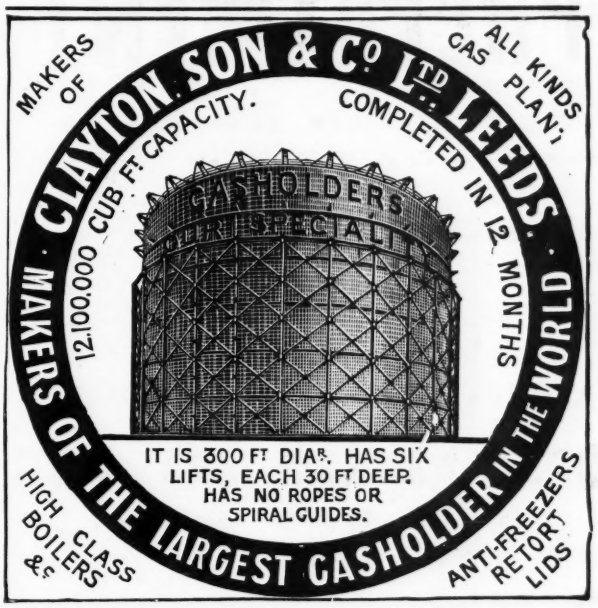
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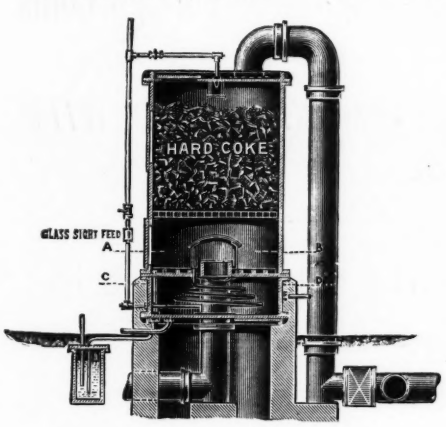


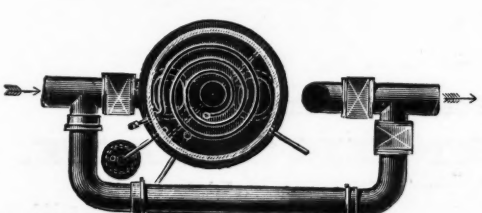

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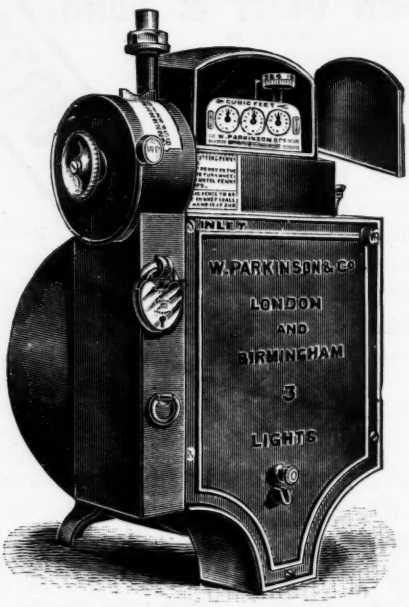


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[See also Advt. p. 190.


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